Telephony.

THE AMERICAN TELEPHONE JOURNAL

Comprising Telephony, American Telephone Journal, Sound Waves, Telephone Magazine, and The Telephone

PUBLISHED WEEKLY BY THE TELEPHONY PUBLISHING COMPANY, MONADNOCK BLOCK, CHICAGO

VOL. XVI. No. 8 — CHICAGO, OCTOBER 3, 1908 — 10 CENTS PER COPY

$2 PER YEAR TO U. S., CANADA AND MEXICO

$3 PER YEAR TO OTHER COUNTRIES

COPYRIGHT 1908. ALL RIGHTS RESERVED

1880 Paris Exposition Medal for Rubber Insulation — 1893 World's Fair Medal for Rubber Insulation

OKONITE — TRADE MARK REG. U.S. PAT. OFFICE

THE STANDARD FOR RUBBER INSULATION

OKONITE WIRES, OKONITE TAPE, MANSON TAPE, CANDEE PAT'D POTHEADS

THE OKONITE CO., Ltd. Sole Manufacturers 253 Broadway, New York

WILLARD L. CANDEE, H. DURANT CHEEVER, Managers. W. H. HODGINS, Secretary. GEO. S. MANSON, Superintendent. W. C. CANDEE, Asst. Secretary

OKONITE — TRADE MARK REG. U.S. PAT. OFFICE

CONDUIT

P C C

CLAY PRODUCT COMPANY

Stock Exchange Bldg. CHICAGO

CHAS. G. STEVENS CO.

BRIGHT COLD ROLLED AND COLD DRAWN

NORWAY IRON, MAGNET STEEL

Cold Drawn Steel—Rounds, Flats, Square, Hexagons.

COLD ROLLED STRIP STEEL

LARGE STOCK ALWAYS ON HAND.

58-60 South Canal Street, CHICAGO

McROY CONDUITS

CHICAGO

ROOKERY BUILDING

KERITE

Insulated Wires and Cables

1850 — DAYS KERITE — 1908

The Insulation which has withstood successfully the test of half a century

W. R. BRIXEY, Sole Manufacturer

HUDSON TERMINAL

30 Church Street, NEW YORK

CHICAGO TELEPHONES SATISFY

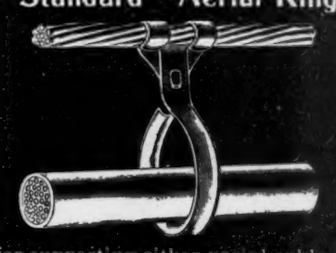
CHICAGO TELEPHONE SUPPLY CO.

FACTORY AND GENERAL OFFICES

ELKHART, IND. U.S.A.

Save cross-arms by using our

"Standard" Aerial Rings



for supporting either aerial cable or insulated service wires. These rings are guaranteed not to slip on the supporting strand when cable is being installed. May be applied by ordinary gas pliers. Prompt deliveries guaranteed. In ordering state diameter of supporting strand used.

YONKERS SPECIALTY CO.

Yonkers, N. Y.

"DETROIT" RUBBER COVERED WIRES

Telephone Pair a Specialty

DETROIT INSULATED WIRE CO.

Detroit, Mich.

PLATINUM

Wire, Sheet, Rivets and Contacts

Send for Literature

BAKER & CO., Inc., Newark, N.J.

N. Y. Office: 30 Church Street

TELEPHONE CABLE

WATERBURY CO., 69 SOUTH STREET, NEW YORK CITY

ALPHABETICAL INDEX TO ADVERTISEMENTS ON PAGE 20

Simple and Scientific

We ship fresh goods to you direct from our factory

Bulletins

No. 15. — The Construction of Dry Cells

No. 16.—The Dry Cell and the Telephone Manager

Sent on Application

FLEUR DE LIS DRY CELL

FOR TELEPHONE SERVICE

French Battery & Carbon Co., Madison, Wis.

The Indiana Rubber & Insulated Wire Co.

MANUFACTURERS OF

Insulated Wires and Cables

JONESBORO, IND.

We Make Toll Tickets by the Million

By means of new facilities just acquired, and thus produce them better and cheaper than can be done in small lots. We can furnish them promptly in any quantity, on better paper, put up in better shape, and at LOWER PRICES THAN EVER BEFORE OFFERED.

WE ALSO FURNISH

Lease Records
Toll Journals
Toll Ledgers
Monthly Check Reports
Cash Books
Directories
Trouble Tickets
Rental and Toll Bills
Voucher Checks
Card Index Systems
Steel Telephone Signs

All kinds of Blanks, Forms and Books for Telephone and Toll Line Accounting.

Write for Sample Forms and Prices.

THE TELEPHONE PRINTING COMPANY

DEFIANCE, OHIO

HOW TO USE THE WILLIAMS TEST CLAMP

Hold clamp between thumb and first finger, then press together, causing the jaws to open wide. Insert the wire you are to test in the valley or groove and release the pressure, allowing the needle points to come down on the insulation with a clean bite. Then with the thumb on the stud or screwcap press the jaws together firmly. This will force the needles through the insulation, making a good contact with the conductor, which contact the spring steel jaws will hold steadily while the test is made. Send 75c. for a set (2) postpaid. Your money back if you want it.

The Williams Test Clamp Co.

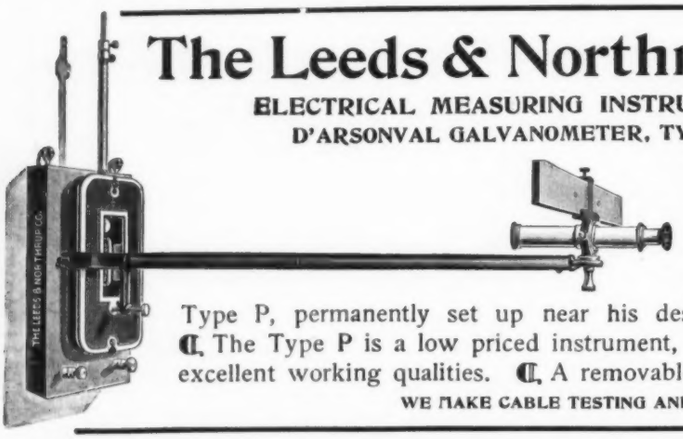
720 Electric Bldg. Cleveland, O.

The Leeds & Northrup Co., 4901 Stenton Avenue PHILADELPHIA

Monadnock Block CHICAGO

ELECTRICAL MEASURING INSTRUMENTS

D'ARSONVAL GALVANOMETER, TYPE P



¶ Your wire chief has use for a reflecting type D'Arsonval Galvanometer. His cable testing set will have a greater range if he can make insulation and capacity measurements with a reflecting galvanometer. With our Type P, permanently set up near his desk, he can make routine tests of insulation. ¶ The Type P is a low priced instrument, well made, of pleasing appearance, and has excellent working qualities. ¶ A removable damper converts it for ballistic measurements.

WE MAKE CABLE TESTING AND FAULT LOCATING APPARATUS

MONNOT COPPER-CLAD STEEL WIRE

Twisted Pair Drops of No. 17 B. & S. will not corrode at cable box as does iron

MANUFACTURED BY

Duplex Metals Co., 208 Fifth Ave., New York

TELEPHONE CABLES

TELEPHONE WIRE

WIRE ROPE
WIRE STRAND

JOHN A. ROEBLING'S SONS CO.

TRENTON, N. J.

CIRCULAR LOOM

IN YOUR STORAGE BATTERY ROOM

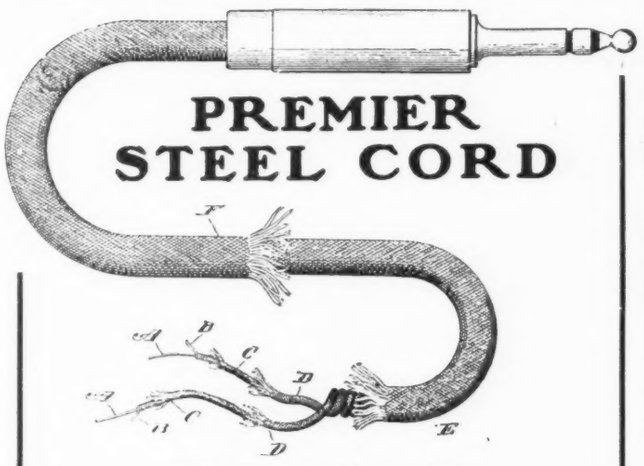
AMERICAN CIRCULAR LOOM CO.
TRADE MARK REGISTERED

Use Circular Loom for protecting and insulating your battery leads. Place Circular Loom around metal pipes running above the cells to protect them from fumes and to keep metal particles from falling off into the battery. It's neater and better than the ordinary boxing.
You'll find new Circular Loom uses for every day.

Order from your dealer or address

AMERICAN CIRCULAR LOOM CO.
BOSTON, MASS.

NEW YORK CHICAGO SAN FRANCISCO



PREMIER STEEL CORD

ALWAYS IN ALIGNMENT

In the hollow of the cord at the plug end, there's a reinforcing spring made of the highest grade spring steel. Not only does this prevent the conductors from being thrown out of alignment, but it also makes it practically impossible to break the cord at the plug end, and that's where the strain is greatest. Operators don't have to be careful when you use Premier Steel Cord—it'll last in spite of shamefully careless usage. Better get details.

Runzel-Lenz Electric Mfg. Co.
97-101 South Clinton Street, Chicago

PEIRCE
SPECIALTY
COMPANY
ELKHART, INDIANA

ENGINEERS, DESIGNERS and MANUFACTURERS

Peirce Specialties

All Steel Pole Brackets, All Steel House Brackets, All Steel Transposition Brackets, Pole Seats (5 Designs), Cross Arm Back Braces (Channel Steel), Distributing Circles (3 Design), Fastenings for twisted pairs, Expansion Bolts, Hammer Drills for Drilling Masonry, Test Connectors and Cable Hangers

To inspect the hook switch, loosen the knurled nut at top of stem. You do this with your fingers; there are no mysterious "catches" or patent spring locks to monkey with.

As soon as the nut is loose, the casing may be removed. Now you can see every working part and every wire, and yet every part is operative. There is not a sliding contact in the stand. Every connection is soldered.

By removing **one** screw in the center of the base, the cord terminals are reached. These are of generous size, so you don't need a watchmaker's screwdriver to put in a new cord.

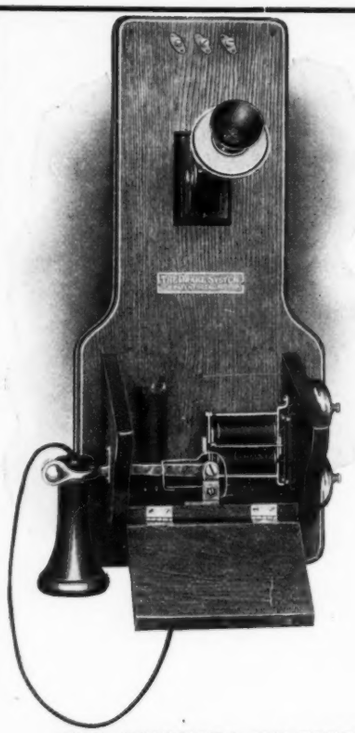
The hook lever is the part that usually "gets it" when the stand is knocked over, so we put this on with a screw. Another lever can be put on in an instant, as shown. No adjustments.

WHY do some stands pull apart into many different pieces? You can't test them when they are apart, and can't see the parts when they are together. What's the use?

Get our Bulletin No. 63

The Sumter Telephone Mfg. Co.

SUMTER, S. C.



OTHERS DID.

Did You

write us about our four party selective apparatus.

IF NOT IT IS NOT TOO LATE

Befriend yourself and let us tell you of its decided **SUCCESS.**

You would be interested. We would be pleased.

THE STANDARD TELEPHONE MFG. CO.

PORTSMOUTH - - - OHIO

Successors to

The Williams Telephone & Supply Co. ∴ ∴ Cleveland, Ohio
The Knox-Dickey Telephone Mfg. Co. ∴ ∴ ∴ Portsmouth, Ohio
The Drake Telephone Co. ∴ ∴ ∴ ∴ McConnelsville Ohio

We want YOU to have our new catalog

If You Consider

THE POOLE

Lock-Out System

as an addition to party-line service, you are wrong. It is not something added—it is a feature which has always belonged to good service. It unfailingly gives absolute

SECRECY

to any of the parties on the line. It gives the subscriber all the advantages of a private line at the cost of a party line. It enables you to put more parties on a line, and get higher rates.
Now, do you want details?

Mountain State Electrical Co.,

Wheeling, W. Va.

How "Stromberg-Carlson" Magneto Telephones Refund Their Cost—and More

¶ From the moment they go into practical operation, "Stromberg-Carlson" Magneto Telephones pay you dividends.

¶ They PAY in MINIMUM MAINTENANCE COST for subscriber and owner alike. They PAY in INCREASED EFFICIENCY made possible only by "Quality Apparatus." They PAY like a gilt edge bond in their guarantee of DIVIDENDS—the dividends that insure your continuance in a good business.

¶ Examine every point in the construction of a "Stromberg-Carlson" magneto telephone—then compare it with any other instrument and LET US QUOTE YOU OUR LATEST PRICES.

No. 7—Line Binding Posts and Carbon Block Lightning Arrester.

No. 5—Hookswitch—Its point of merit: Simplicity, good mechanical construction, positiveness of action, lever movement, such as will insure maximum pressure on contacts. There are no "floating springs."

Golden Oak Woodwork—Now made in our own factories from carefully selected kiln-dried oak woodwork—machine made and hand finished by expert cabinet makers. Nothing cheap.

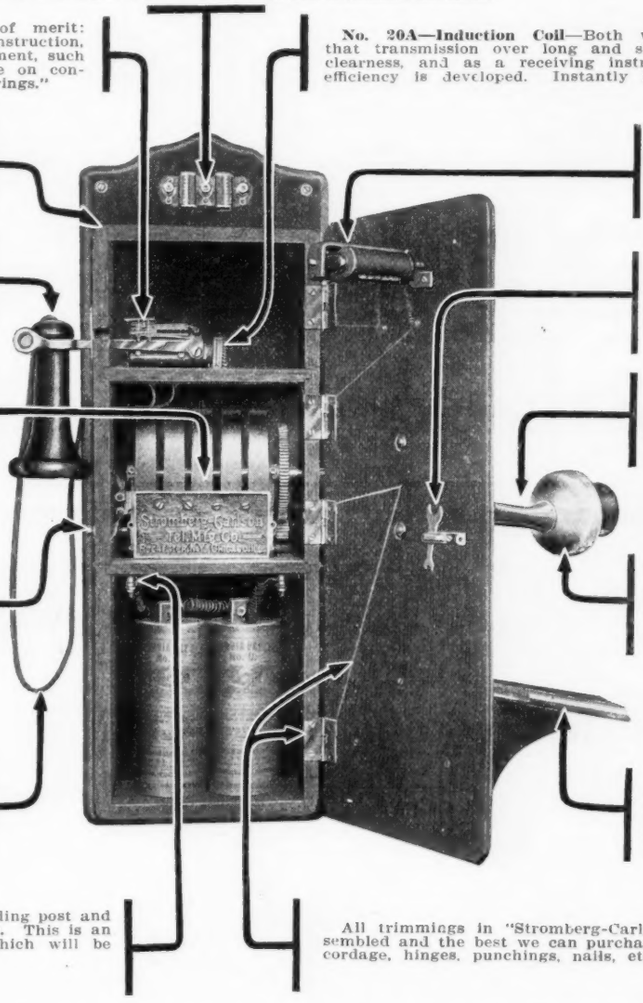
No. 14A—Receiver—The acknowledged standard for any kind of telephone work. Receiving qualities well defined and distinct. Permanent adjustment — no castings — uniform ground pole pieces. Composition shell.

No. 24—Generator—Its high voltage output and greater permeability make it the best generator for all kinds of service. Well designed laminated carefully wound armature. Machine cut gears.

A screw lock that fastens door firmly. Has a spiral tension spring that keeps screw end back from lock bracket when swinging door closed.

No. 7 — Receiver Cord — A braided copper tinsel conductor cord insulated with braided cotton and green spun machine silk. The best cords that can be bought. They outwear any other kind.

A combination machine, nut binding post and soldered terminal for the batteries. This is an extra feature we provide and which will be found a great convenience.



No. 20A—Induction Coil—Both windings are so proportioned that transmission over long and short lines is a maximum for clearness, and as a receiving instrument the highest degree of efficiency is developed. Instantly removable.

No. 6—Ringer—No design ever approached it for simplicity—durability and efficiency. Armature and clapper rod adjustment independent of ringer mounting. Special spool construction—full copper windings.

This double end wrench is one of the accessories furnished for adjusting any nuts used in the construction of the various parts constituting a complete magneto telephone.

No. 10—Transmitter Arm—Made of cold drawn steel—including the base of one piece. Indestructible and adjustable. Richly enameled and hand finished. Improves the appearance of any telephone.

No. 7 — B Transmitter — A leading product that is out of experimental class—producing everlastingly the maximum volume of voice transmission with excellent articulation. Every atom of carbon used is made in our own factory.

Some ingenuity is exercised in the design of our telephone cabinets. All corners and surfaces are made plain to simplify finishing and insure protection against breakage.

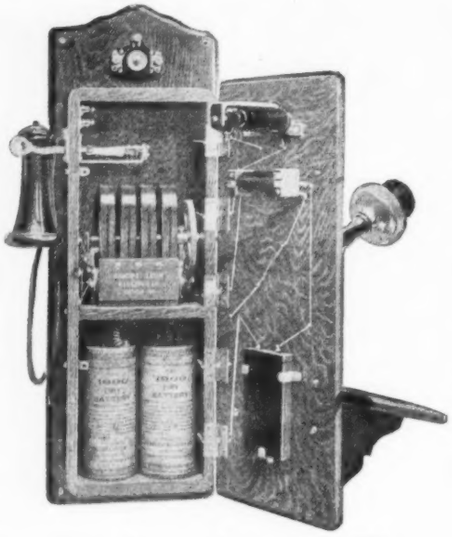
All trimmings in "Stromberg-Carlson" instruments carefully assembled and the best we can purchase. Special terminal wires and cordage, hinges, punchings, nails, etc., are provided.

Our Bulletin No. 19 explains the superior advantages and exclusive features of all "Stromberg-Carlson" Magneto Telephones. May we send it to *you*, to-day?

STROMBERG-CARLSON TEL.MFG.CO

ROCHESTER, NEW YORK, U.S.A.

CHICAGO, ILL. KANSAS CITY, MO.



WHEN YOU order a Cracraft, Leich Telephone, you can rest assured that you will not only receive a telephone that is properly designed, but also one that is properly made. None but the best of materials are used in its construction. Our manufacturing department is equipped with the proper tools and gauges, making our product uniform and reliable.

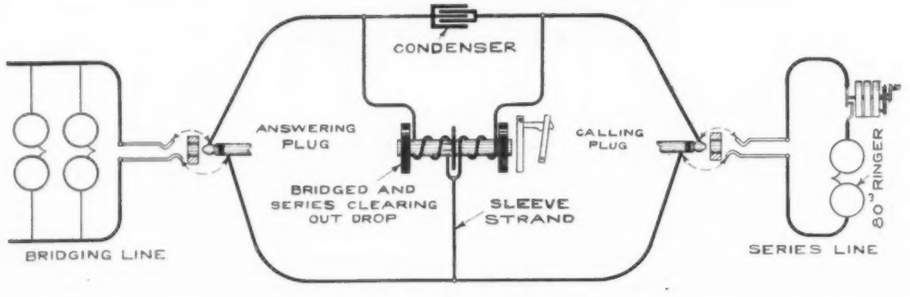
We make every part of this telephone except the cabinet. The cabinet is made per our specifications and is the best we can buy. Telephones shipped with or without batteries as desired. Write to us. We can be of service to you.

Cracraft, Leich Electric Co., Genoa, Ill.

THIS CORD CIRCUIT

Shows the arrangement of the

Monarch Bridged and Series Clearing Out Drop



It is practically impossible for a ring off from the bridging line to reach the series instrument. The condenser forces the ring off through the clearing out drop, yet offers practically no resistance to the voice currents.

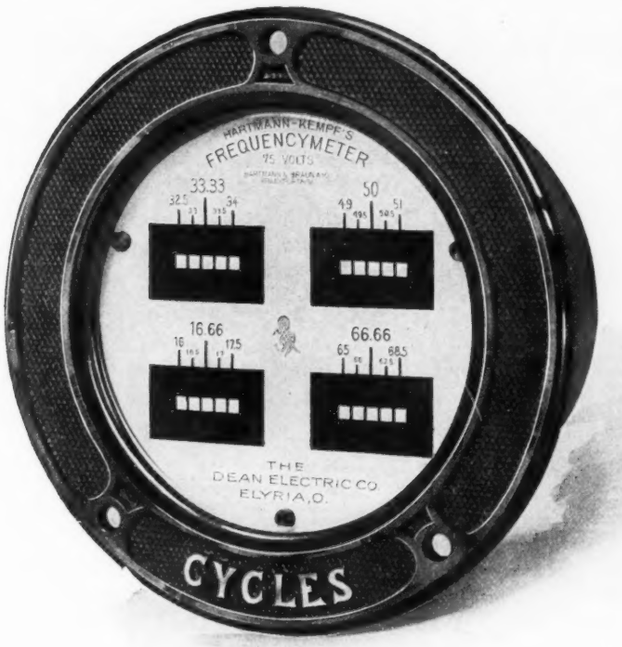
Let us send you our Bulletin No. 5 which describes in detail this and other clearing out systems we have developed.

We will appreciate an opportunity to figure on your next order for magneto or common battery equipment.

MONARCH TELEPHONE MFG. CO.

Factory and General Office:
Washington and Morgan Streets, CHICAGO, ILL.

Branch House:
177 Main Street, DALLAS, TEXAS



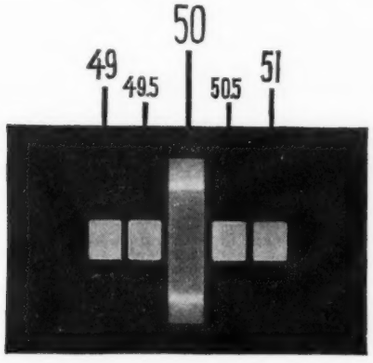
SCIENTIFIC SELECTION

¶ **The "Dean" Harmonic System** is still the only successful party line selective ringing apparatus in the world.

¶ **Absolutely no Failures** is the "Dean" record since the introduction of our Harmonic Converter (registered trade-mark) and our Harmonic telephones.

¶ **No working Installations** can be shown by some of the makers of imitating appliances—hence the long list of "Dean" successes is abundant proof of superiority.

¶ **Even the Slightest** uncertainty is now eliminated —"Dean" selective ringing is an exact science through the use of the



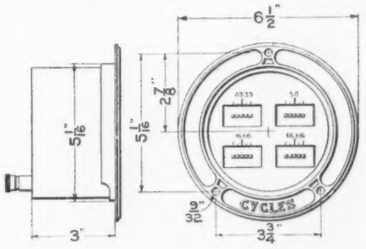
Hartmann-Kempf Frequency Meter.

¶ **With this Instrument** the number of cycles per second may be readily determined—the reading is instantaneous.

¶ **Plain Readings** are indicated by the reeds which vibrate as illustrated. Each of these reeds is a separate unit, even if one should be broken, the efficiency of the others would not be impaired.

¶ **Their Permanency** has been proven by three years' continuous vibration before the invention was marketed.

¶ **Hartmann-Braun, A. G.,** the manufacturers, of Frankfort a /M, Germany, have made us the American sales agents for this special instrument.



¶ **The Exact Dimensions** are shown in this drawing. The meter may be mounted in a portable case, or on a suitable mounting board above your power panel; or, it may be specified for any new "Dean" board.

¶ Send for Dean Folder No. 15.

The Dean Electric Company

ELYRIA, OHIO, U. S. A.

San Francisco **Kansas City**

The Ellsworth County Telephone Co.

C. F. POHLMAN, President and Manager
F. A. MERYWEATHER, Treasurer
M. L. MEEK, Secretary

TELEPHONES

LOCAL AND LONG DISTANCE TOLL LINES
ELECTRICAL CONSTRUCTION WORK

Ellsworth, Kan., August 2nd 1902.

Long Distance Telephone Mfg.Co.,
South Bend, Ind.

Gentlemen:-

In reply to your letter of the 1st beg to say that we are very well pleased with your transmitter that we have been using and think it is good enough for anybody

Respectfully,

The Ellsworth County Telephone Co.
By C. F. Pohlman Mangr.

NEW No. 2525 H.-C. DESK SET

Most Unique, Durable and Convenient Desk Set Made

By the removal of one screw the set can be taken apart, the outer casing removed the stand reassembled in skeleton form in operative condition with hook switch, induction coil, terminal block and wiring exposed for inspection and this is done without having to disconnect any wires.

Write for Bulletin 205X And Price List

The Holtzer-Cabot Electric Company

Boston (Brookline) Mass.
395-397 Dearborn St. Chicago, Ill.

A TELEPHONE

Intelligently and honestly made will necessarily have trouble causes eliminated.

We manufacture such a telephone.

We also rebuild telephones; like persons, every old telephone has some good points.

We take these good things, put good new things with them and make a good, new, rebuilt phone that costs you less money than a complete new phone.

WRITE US ABOUT IT

INDEPENDENT TEL. MFG. CO.
MADISON, : : WIS.

"REBUILT"

TELEPHONE EQUIPMENT
is "REBUILT" not "REPAIRED"
One's like "New," the other's "Old"—always will be

Our "Rebuilt" Equipment Department "Rebuilds" Switchboards—Telephones—Apparatus—Additional Switchboard Equipment—and Handles—Wire—Cable—Cords—Everything Telephonic.

GUARANTEED SAVING 30 TO 50 PER CENT

Get Quotations, and if you want our "Rebuilt" Bargain Bulletin sent you regularly—say so—it's FREE. *Address*

"REBUILT" EQUIPMENT DEPARTMENT
PREMIER ELECTRIC CO.
VAN BUREN & CLINTON STS. CHICAGO, ILL.

Remember "Rebuilt"—Not Repaired

Notice the Dimensions

of an Ericsson 2800 Magneto or Common Battery Multiple Switchboard Section. They are a whole lot smaller than those you are used to see. Compare them with the dimensions of the Switchboard you now have.

Your operator will tell you "what a difference a few feet make" in her reach.

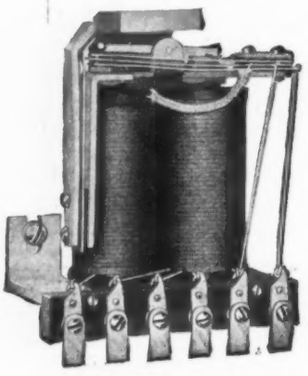
Select wisely next time you're in the market for a Switchboard.

L. M. Ericsson Tel. Mfg. Co.

BUFFALO, N.Y.

ROBERTS Selective Ringing Secret Service SYSTEM

THIS DOES IT



ROBERTS RELAY

We can increase your revenue 50%

REVENUE

We are doing it for others

INCREASED

Are you interested?

If so write us

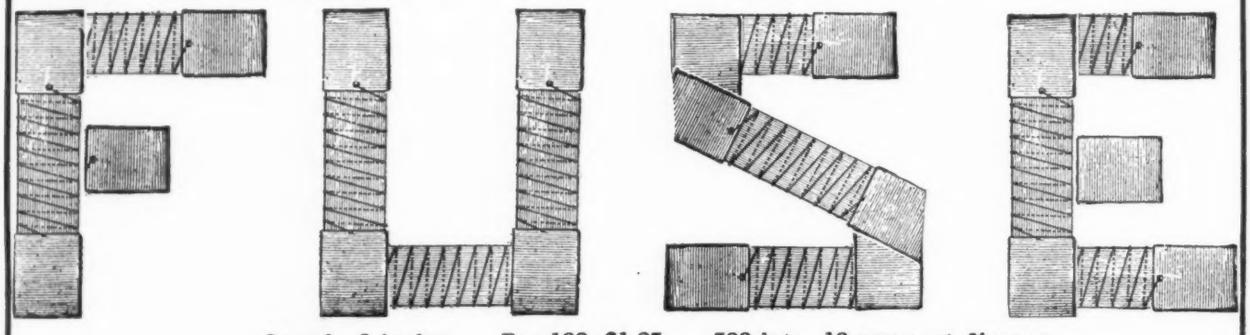
Homer Roberts Telephone Co.

1703 MELROSE STREET, CHICAGO

USE THE BEST COSTS NO MORE

6 times the fuse length
18 sharp angles for impedence
Special wire accurately rated, not easily broken. Tinned copper terminals, can be used on any standard W. U. block

No. 1 Patent Wrapped

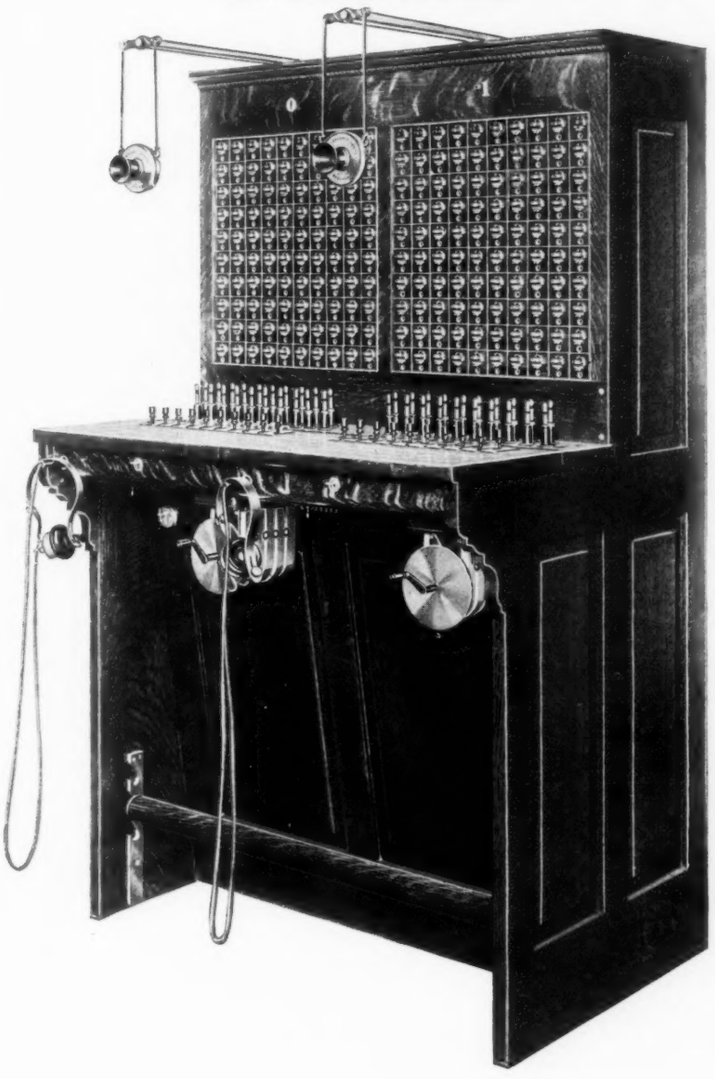


Length, 2 inches. Per 100, $1.25. 500 lots, 10 per cent discoun

Order of Your Dealer or of
CENTRAL TELEPHONE & ELECTRIC CO.
ST. LOUIS - DALLAS

P. S.—Our Bulletin 28 shows complete line of lightning protective devices. All good. Like all our bulletins free for the asking.

200 Line Switchboard with 200 Unit Type Self-contained Drop and Jacks installed



"Switch-Boards"

We can furnish switch-board of any desired capacity. You can have your cabinet wired to its full capacity, install number of drops you actually have use for and add additional ones from time to time as needed, one at a time if desired. You are not required to buy a bank of five or ten if only two or three are needed. Your money invested only in equipment that is earning something for you.

Our central office equipment has features of distinct advantage not found in other makes. A little investigation will prove this to you conclusively. You will favor yourself by investigating our apparatus, getting our specifications and prices before placing your order elsewhere. We solicit your inquiries and invite your critical investigation of our products.

Ask for complete
Specifications, Blue Prints
and
Illustrated Literature
Prices on Application

Type of Drop and Jack used in above Illustrated Switch-Board
Note Coil Removing Feature

Swedish-American Telephone Co.

Chicago

BRANCH, KANSAS CITY, MO.

IN THE **Clement Automanual System**

all automatic switches are operated upon local circuits of uniform resistance and capacity and without the interference of earth potential.

¶ The only piece of mechanism operated by currents traversing the line wire is the line relay and as this relay is always operated by its own line it is necessary to adjust it to the conditions of this one line only.

¶ In systems where the selective impulses originate at the subscriber's telephone, all switches must be adjusted so that they will respond equally well to impulses over long or short lines, lines of high or low capacity, lines affected in different degrees by earth potential, etc., as any one switch is liable to be called into requisition by any exchange line. Your experience will tell you that it is impossible to adjust even a simple line relay so that it will meet such conditions satisfactorily.

¶ The Clement Automanual has but one condition to meet and meets it with a record of 100%.

Trade mark
AUTOMANUAL
Reg. U. S. Patent Office

The North Electric Company

DALLAS Cleveland KANSAS CITY

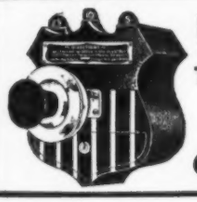
If You Have Money to Burn

it does not make any difference to you whether your telephones get out of order or not, but if you are in business to make money, not to spend it, the best telephone you can get is the one you want to buy. The Andrae Special Heavy Giant will last more years with less repairs, ring stronger and talk further than any other telephone to be bought at any price.

It is easy to prove this. Put one or two on your lines and compare them with others and then ask for our guarantee.

JULIUS ANDRAE & SONS CO.

48 Years Keeping Money Out of the Fire at MILWAUKEE, WIS.



DO YOU WANT WHAT'S DUE YOU?

THEN INSTALL **GRAY PAY STATIONS** AND YOU'LL GET IT

All details are in Catalog No. 50. Write for a copy.

GRAY TELEPHONE PAY STATION CO., Hartford, Conn.

Insulated Staples

4 Sizes

Pat. Nov. 1900

BLAKE

TUBE FLUX for SOLDERING

Full Size of Tube, 1" x 5"

Patented Feb. 4, '08

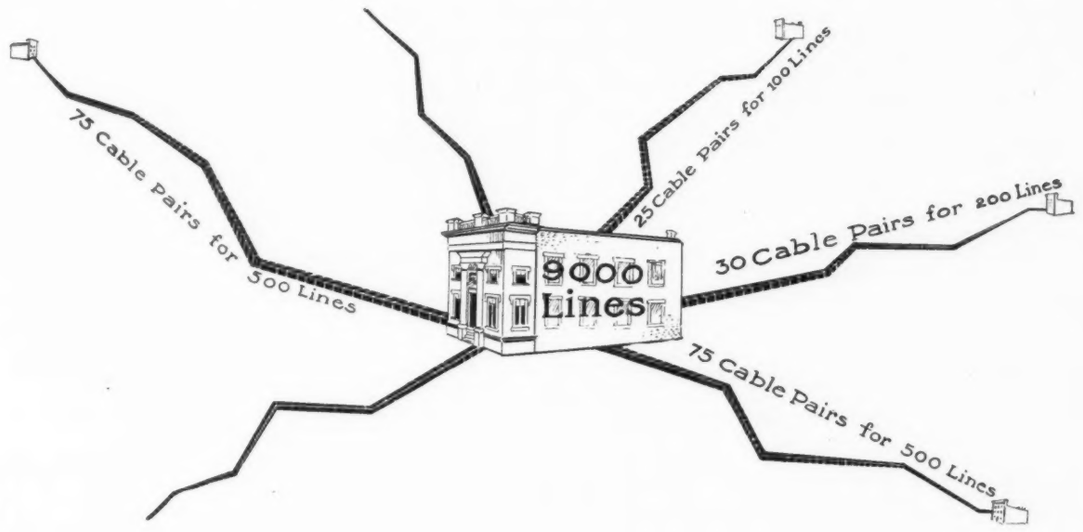
COMPRESSED CLEATS FOR USE ON PLASTERING

EXACT SIZE PAT. JULY 1906

BLAKE SIGNAL & MFG. CO. WRITE FOR SAMPLES 246 SUMMER ST., BOSTON, MASS.

Invest in an Octopus

It's a Good Dividend Payer


75 Cable Pairs for 500 Lines
25 Cable Pairs for 100 Lines
30 Cable Pairs for 200 Lines
9000 Lines
75 Cable Pairs for 500 Lines

WE will sell you a puppy and you can raise it yourself. To be more specific, we will help you to found and grow a Multi-Office Automatic Telephone System in your city that will save you so much cable that you can't keep it from paying dividends. With this system you put your switchboards where your subscribers are and don't go broke buying cable to bring your subscribers to one centrally located switchboard. For example—One company put a 500 line Automatic substation 3 miles from its central office and saved enough in cable and conduit to pay twice over for a lot and a handsome, brick residence and office building, combined, in which the equipment was installed. The cost of all labor employed in this office is $75.00 per month, $1.80 per line per annum. The service is just as good as in a single office system. Ask us to tell you more about it.

Our Automatic System has been adopted in the following cities:

Aberdeen, South Dakota.
Akron, Ohio.
Allentown, Pennsylvania.
Auburn, Maine.
Auburn, New York.
Battle Creek, Michigan.
Beaver Falls, Pennsylvania.
Bellingham, Washington.
Berkeley, California.
Billings, Montana.
Butte, Montana.
Cadillac, Michigan.
Champaign, Illinois.
Chicago, Illinois.
Cleburne, Texas.
Columbus, Georgia.
Columbus, Ohio.
Dayton, Ohio.
Decatur, Illinois.
Dowagiac, Michigan.
Edmonton, Alberta, Canada.
El Paso, Texas.
Emaus, Pennsylvania.
Fall River, Massachusetts.
Grand Rapids, Michigan.
Hastings, Nebraska.
Havana, Cuba.
Hazleton, Pennsylvania.
Holland, Michigan.
Hopkinsville, Kentucky.
Houston, Texas.
Jonesboro, Arkansas.
Kenton, Ohio.
Lake Benton, Minnesota.
Lansing, Michigan.
Lewiston, Maine.
Lincoln, Nebraska.
Los Angeles, California.
Manchester, Iowa.
Marianao, Cuba.
Medford, Wisconsin.
Mount Olive, Illinois.
New Bedford, Massachusetts.
Norfolk, Nebraska.
Oakland, California.
Ocean Park, California.
Omaha, Nebraska.
Pontiac, Illinois.
Portland, Maine.
Portland, Oregon.
Princeton, New Jersey.
Richmond, Indiana.
Riverside, California.
Rochester, Pennsylvania.
Rushville, Indiana.
San Diego, California.
San Francisco, California.
Santa Monica, California.
Saskatoon, Sask., Canada.
Sioux City, Iowa.
South Bend, Indiana.
Spokane, Washington.
St. Marys, Ohio.
Strathcona, Alberta, Canada.
Tacoma, Washington.
Toronton Junction, Canada.
Travers City, Michigan.
Urbana, Illinois.
Van Wert, Ohio.
Washington, Pennsylvania.
Wausau, Wisconsin.
Westerly, Rhode Island.
Wilmington, Delaware.

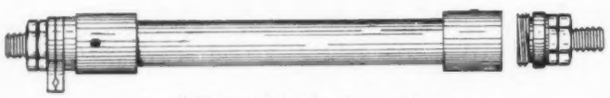
Automatic Electric Company

Van Buren & Morgan Streets

Chicago, U.S.A.

AMERICAN PORCELAIN FUSES

TRIPLE LENGTH OF FUSE WIRE

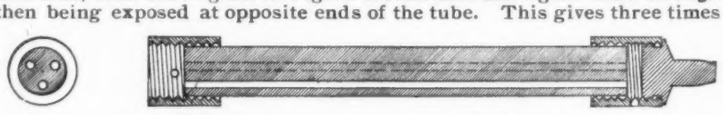


Type "W" Porcelain Line Fuse with Clamp.

Two new American Porcelain Fuses are here illustrated. They are of a new design and possess distinct merits in comparison with other fuses.

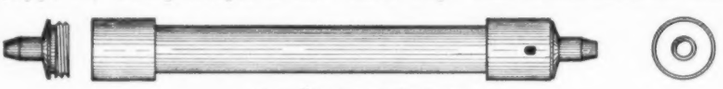
The fuse tube is made of unglazed porcelain, which is made extra tough and strong by a special process. Porcelain, of course, is a perfect insulator, and, being porous, permits the escape of gases generated by the blowing of the fuse.

But the most important and novel advantage of the American Porcelain Fuse lies in the way that the fuse wire is passed through the tube. The tube contains three holes or channels for the wire, instead of the one hole of ordinary fuses. The wire is passed through the tube in one hole, then back again through a second hole and again back through the third hole, the two ends of the fuse wire then being exposed at opposite ends of the tube. This gives three times the length of fuse wire in the same length of tube, and makes the safest fuse on the market to-day. It also makes it possible to mount fuses in a smaller space than can be done with any other fuse. The fuse terminals are made in two pieces, a "ring" and a "head." The ring is permanently fastened to the porcelain tube, but the head is removable. The fuse wire is soldered to the ring, through a hole in the side, and then the heads are screwed into place in the rings. The unscrewing of the heads exposes the fuse wire for inspection or repair.



Cross Section American Porcelain 3-Way Fuse

This new design of American fuse has been made up in two standard styles as shown in the illustrations, one style being for use as a line fuse with clamps (Type W,) and the other style being made plain for use in cable boxes, etc. (Type V.) The principle of the "three way" fuse is the same in both styles. American Porcelain Fuses are the safest fuses made, because within the same length as ordinary fuses, they afford three times the ordinary fuse wire length. They also are the most easily renewed of any fuses on the market.

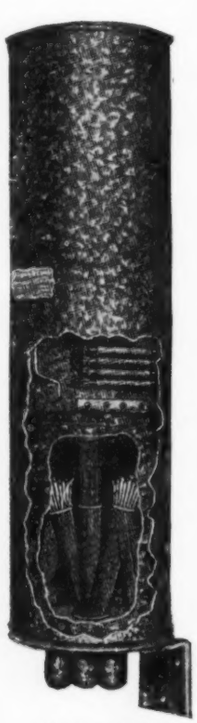


Type "V" Porcelain Fuse.

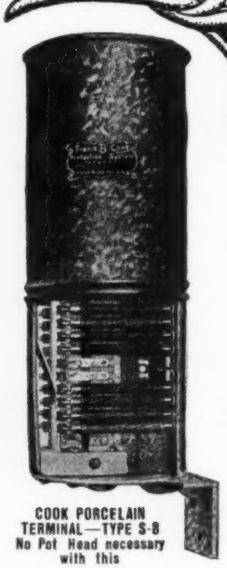
AMERICAN ELECTRIC FUSE CO.

MUSKEGON, MICH. - - - - - NEW YORK, N. Y.

COOK TERMINALS AND JUNCTION BOX



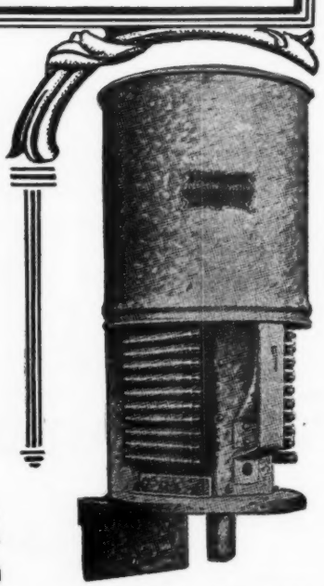
COOK NEW JUNCTION BOX AND TERMINAL COMBINED



COOK PORCELAIN TERMINAL—TYPE S-8 No Pot Head necessary with this

Like all Cook specialties these here shown appeal to the experienced telephone man by virtue of their labor and time saving features and by their extreme durability. Call us up by phone or mail and we'll send the details.

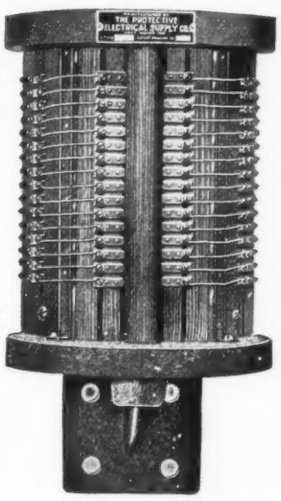
Frank B. Cook
MANUFACTURER
of TELEPHONE PROTECTIVE APPARATUS
CHICAGO ILLINOIS
242 WEST LAKE STREET



TYPE S-6. COOK POLE CABLE TERMINAL

DID YOU?

Ever figure what your Fuse Maintenance on Cable Terminals is costing you?



If Not, Do So

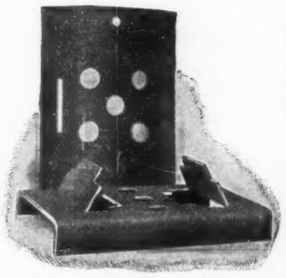
This can top Cable Terminal has no pot heads. No wiped joints and fuse. Cost but **5c per 100.** Better let us save you some money on your next terminal order.

GET OUR ILLUSTRATED BOOKLET

The Protective Electrical Supply Co.

FORT WAYNE, IND.

BELDEN STEEL GAINS



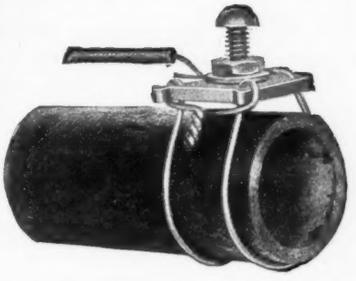
A practical and economical steel support for attaching cross arms without cutting gain in the pole.

Write for prices and description of the 14 sizes we make for telephone, telegraph, electric light and power transmission work.

BELDEN GROUND CLAMPS

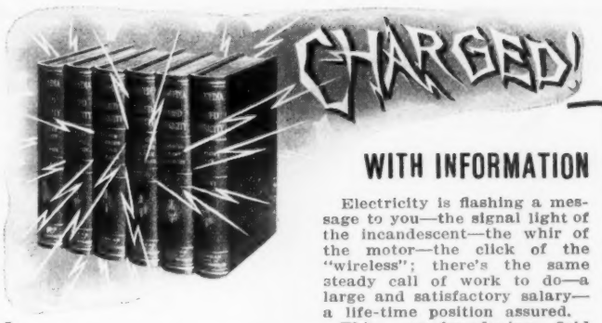
Contain greatest strength with lowest price and the one size will fit any size of pipe.

Screw driver and pliers only needed for attaching.



BELDEN MANUFACTURING COMPANY

194 MICHIGAN STREET, CHICAGO



WITH INFORMATION

Electricity is flashing a message to you—the signal light of the incandescent—the whir of the motor—the click of the "wireless"; there's the same steady call of work to do—a large and satisfactory salary—a life-time position assured.

This ever-broadening field offers its treasures to you. Just a few hours' study each week and the prize is yours. Our new Six Volume Edition of the

Cyclopedia of Applied Electricity

will give you just the information you will require to do greater things, to become a greater man mentally—an authority on everything electrical. 3,000 pages, 7x10 inches, illustrated by special drawings, diagrams, photographs, tables and formulas; bound in half morocco.

Every known electrical appliance is given special attention, every subject treated by an expert—written plainly and clearly. This wonderful Cyclopedia is authoritative, comprehensive, will give you the opportunity you desire, no matter if you are working at the bench or an experienced electrician.

Electricity is the life blood of the telephone. Inventors may do away with "hello girls" and wires, but they cannot telephone without electricity. Every new invention and improvement is only a further application of electricity. The telephone man who wants to get on in his profession must understand electricity thoroughly, so that he can handle the most delicate instruments and complicated appliances. You can get the latest information, in the most understandable form, from these books. They were written for practical men by practical men; they will tell you just what you want to know in telephone work, or post you on the latest progress in automatic and wireless telephony.

Special Price $18.60, Regular Price $36.00

FREE 5 DAY OFFER

Just fill in the coupon and we will send a set of these beautiful books absolutely FREE for 5 days' examination. If you find the books satisfactory, pay $2.00 within 5 days and $2.00 a month until you have paid the special $18.60 price; otherwise notify us to send for them at our expense. This is a special 30-day offer to introduce our Correspondence Courses from which the Cyclopedia was compiled. As a special inducement to order promptly we will include FREE for one year, the

TECHNICAL WORLD MAGAZINE

a live, up-to-the-minute, $1.50 monthly, crowded with special technical articles written in popular form and illustrated with scores of interesting photographs.

BRIEF LIST OF CONTENTS

Telephone instruments—Telephone Lines—Telephone Exchanges—Common Battery System—Telephone Operation—Telephone Systems—Telephone Maintenance—Automatic Telephone—Wireless Telephony—Electric Wiring—A Modern Central Station Design—The Alternator—The Transformer—Switchboard and Station Appliances—Power Transmission—Mercury Vapor Converter—Elements of Electricity—The Electric Current—Electrical Measurements—Electric Telegraph—Wireless Telegraph—The Telautograph—Insulators—Electric Welding—Direct Current Dynamos—Types of Dynamos—Electric Machinery—Direct Current Motors—Electric Motors—Storage Batteries—Electric Lighting—Electric Railways—Management of Dynamo-Electric Machinery—Power Stations.

AMERICAN SCHOOL OF CORRESPONDENCE

CHICAGO, U. S. A.

FREE OFFER COUPON

Fill in, clip and mail today

American School of Correspondence:
Please send Cyclopedia of Applied Electricity for FREE examination; also T. W. for 1 year. I will send $2.00 within five days and $2.00 a month until I have paid $18.60; otherwise I will notify you and hold the books subject to your order. Title not to pass until fully paid.

Name .....

Address .....

Occupation .....

Employer .....

Telephony, 10-3-'08.

Sterling Can-Top Terminals

—FOR—

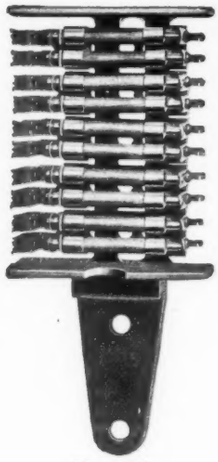
Cable Protection

A few of our many styles

Write for Catalog

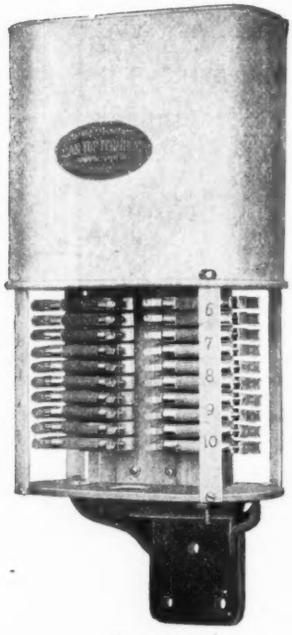
No. 259

Built for top of pole. Has unit type protectors, also guide wire ring.



No. 265

For Multiple Work Built in 5 pairs only.



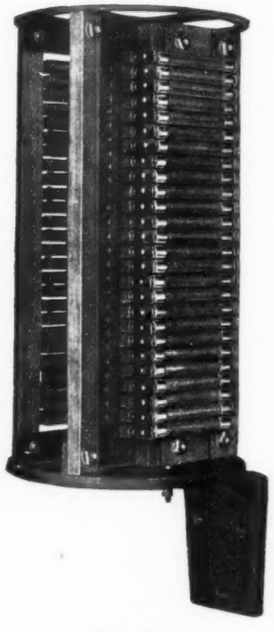
No. 266

Made for side of pole. Has unit type Mounts. Use short length fuse.

GOOD GOODS

FOR

GOOD SERVICE



No. 264

Protectors Mounted on Wood Strips; also made unit type, with Guide wire Strips. (No. 267.) Very popular.

STERLING ELECTRIC COMPANY

LAFAYETTE, INDIANA

No. 247 F

Unit Mount Complete

Sterling Can-Top Terminals —FOR— Cable Protection

A few of our many styles

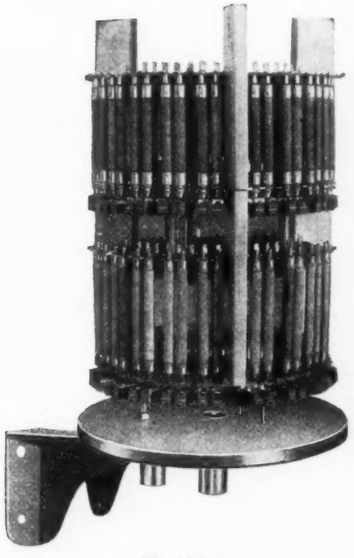
Write for Prices

No. 265

Side view. Has unit type protectors.

No 260.

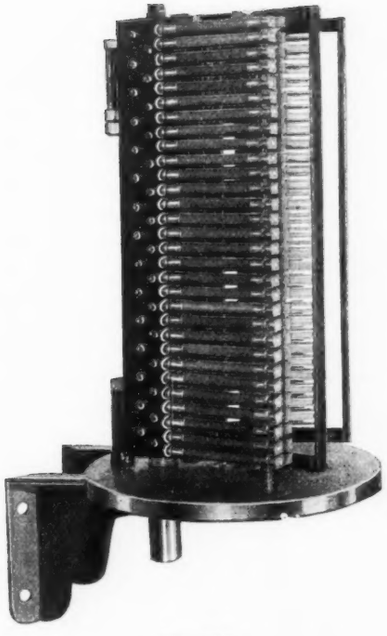
Made in 10 and 20 pair circles. Can be added to one section above the other.



No. 260

This cut shows a two section No. 260 ready for the can.

THE HOUSE OF GOOD GOODS

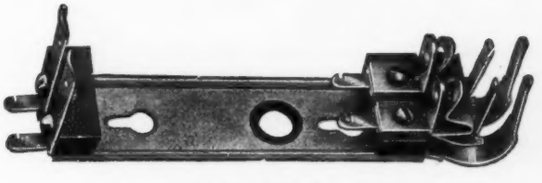


No. 262

This terminal has a closed pot head. Opens up like a hinge, when cable is soldered in it is closed up and filled with compound.

STERLING ELECTRIC COMPANY

LAFAYETTE, INDIANA

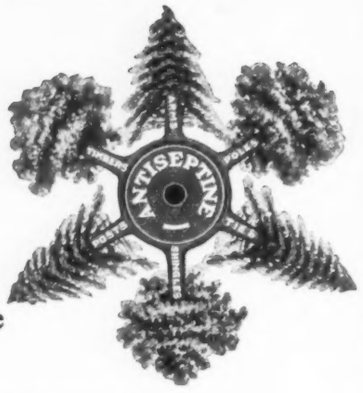


No. 247 F

Unit mount only.

Double the Life of Your Poles

TEN TIMES the Strength of Creosote



ANTISEPTINE
Regis. U. S. and Can.

Doubles the Life of Poles and Cross Arms
The Perfect Cold, Hot Brush and Open Tank Timber Preserver

AMERICAN WOOD PRESERVING CO.
Incorporated 1892
430 THE ROOKERY
Phone Harrison 1345
CHICAGO
Write For Full Information

"C. A. Wood Preserver" (Carbolineum America)
Is composed of over 90% of the highboiling oils, guaranteed to meet most rigid specifications for wood preserver
Prompt shipments from stocks at New York, New Orleans, St. Louis, San Francisco, Salt Lake City and Galveston.
Reg U.S.Pat.O. Nos. 22396 51987
C. A. Manufacturing Co. AUSTIN, TEXAS Masonic Temple

"THEY NEVER PULL UP"
THE MILLER SAFETY ANCHOR
Ask Nearest Jobbing House for Prices. One Dozen on Trial. Freight Prepaid.
Write for Catalogue
THE MILLER ANCHOR CO., NORWALK, OHIO

ASK US TO GIVE
some reasons why it will pay you to specify "AMERICAN" Storage Cells. To charge from an alternating current circuit you need an "AMERICAN" Electrolytic Rectifier. We make them---low-priced, guaranteed to do the work.
American Battery Company
174 S. CLINTON STREET, CHICAGO, ILL.
Established 1889

EXCEPTIONAL OFFER

We are placing on the market, the entire **Central Office and Sub-Station Equipment** of the **Georgia Telephone & Telegraph Co., Savannah, Ga.** Below we list a portion of this equipment, which is in excellent condition:

1 Stromberg-Carlson common battery Switchboard, complete with Sterling Electric Co.'s Main and Inter. Frames.
1600 Stromberg-Carlson Wall sets, equipped with cords, transmitters and receivers.
587 Stromberg-Carlson Desk Sets, equipped with cords, transmitters and receivers.

741	Stromberg-Carlson Transmitters,	Types—
682	"	Receivers, Types—
55	"	Transmitters, (new) Type—
75	"	Receivers, (new) Type—
1	"	Pay Station, Cabinet.

In addition, we have a large number of repeating and induction coils, generators, condensers, coin collectors, service meters and repair parts. For detail information and prices on a whole or part, address

ABRAHAMS & CO., Savannah, Ga.

EASY WAY TO TEST

And locate trouble on grounded and metallic lines, measure resistances of coils, ringers, etc., described in our new catalog of portable and switchboard voltmeters and ammeters. Send for it. It's free.

L. M. PIGNOLET
80 Cortlandt St., New York

TELEPHONE SUPPLIES

Electrical Engineering Co.

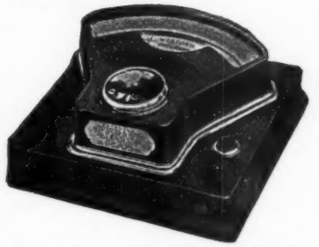
MINNEAPOLIS, MINN.
Prompt Shipments Right Prices

WESTON

STANDARD PORTABLE DIRECT READING
VOLTMETERS, AMMETERS, MILLIVOLTMETERS, VOLTAMMETERS, MILAMMETERS, OHMMETERS, PORTABLE GALVANOMETERS, GROUND DETECTORS AND CIRCUIT TESTERS

Our Portable Instruments are recognized as THE STANDARD the world over. Our STATION VOLTMETERS and AMMETERS are unsurpassed in point of extreme accuracy and lowest consumption of energy.

Weston Electrical Instrument Company
Main Office and Works, Waverly Park, Newark, N. J.
London Branch—Audrey House Ely Place, Holborn.
Paris, France—E. H. Cadiot, 12 Rue St. Georges.
Berlin—European Weston Electrical Inst. Co., Ritterstrasse No. 88.
New York Office—74 Cortlandt Street.



Weston Standard Portable Direct Reading Voltmeter. Model I.

Telephony.

THE AMERICAN TELEPHONE JOURNAL

Comprising Telephony, American Telephone Journal, Sound Waves, Telephone Magazine and The Telephone

Vol. XVI CHICAGO, SATURDAY, OCTOBER 3, 1908 No. 8

PUBLISHED EVERY SATURDAY BY THE

Telephony Publishing Company

Monadnock Block, Chicago

Telephone Harrison 2951

H. B. McMeal, President F. S. Kenfield, 1st Vice-President
W. H. Graffis, 2d Vice-President H. D. Fargo, Secretary-Treasurer

Edited by H. B. McMeal and Franklin H. Reed

The present publication comprises

Vol. 55	The Telephone	No. 8
Vol. 32	Telephone Magazine	No. 8
Vol. 18	American Telephone Journal	No. 14
Vol. 16	Sound Waves	No. 8
Vol. 16	Telephony	No. 8

TERMS OF SUBSCRIPTION:

United States, Canada, Cuba and Mexico.....per year, $2.00
Other Foreign Countries within the Postal Union..... 3.00

NOTICE TO ADVERTISERS

Changes of advertising copy should reach this office ten days in advance of date of issue. New advertisements accepted up to noon of Monday for the paper dated Saturday of the same week.

Copyright, 1908, by Telephony Publishing Company

Entered as second-class matter March 8, 1901, at the post office at Chicago, Ill., under act of March 3, 1879.

CHICAGO, SATURDAY, OCTOBER 3, 1908

CONTENTS.

Editorial 315
The Directory from the Operating Side. By John Putnam.... 317
Conduit Construction—Methods and Costs. By Clarence Mayer 320
Hints on Soldering. By Wm. R. L. Dwyer 323
Train Dispatching by Telephone. By G. W. Dailey..... 325
U. S. Copper Production in 1907 328
Current Telephone Literature. By H. P. Clausen..... 329
Letters on Practical Subjects 329
Common Battery Private Line 329
Concerning a Bell Pamphlet 330
Practical Questions and Answers 333
The Telephone in the Courts. By A. H. McMillan..... 334
Telephone Finances 335, 336
Telephone News 336, 337, 338, 339, 340, 341
Telephone Patents 341
In the Manufacturing Field 342
Condensed News Reports 343, 344

The California Franchise Decision.

It is well for a telephone company to consider municipal authorities as an important factor in the telephone business, act according to their wishes whenever practicable, and try to make its transactions conform to the requirements of law. For a telephone company to have a franchise from a city, even though it is unnecessary under the state law, is better than to depend merely upon the state law and ignore the municipality. This, of course, is true provided a reasonable franchise can be obtained in a reasonable manner. The securing of a franchise, in a certain sense, puts the approval of the municipality upon the company, is of advantage to the company in appealing to business men, and puts it in a better position to deal with the municipal authorities after it is organized.

The Independent companies of the country have recognized all these truths quite generally, and have usually taken pains to secure a franchise before commencing business. This is probably due to the fact that they are largely made up of citizens of the community in which they are doing business. The Bell telephone companies, on the contrary, seem to have preferred to do business, wherever possible, without the sanction of local legislative bodies. This has not only given them the appearance of being outside intruders in the community, which they really are, but has also brought them a multiplicity of litigation, and in many cases defeat and ultimate hard feeling.

Such has been the experience of the Pacific Telephone and Telegraph Company at Pomona, Calif., where it refused to take out a franchise to enable it to carry on business in the city. The company took the position that it was a telegraph company, and hence had a right, under the Federal Telegraph Act, to operate a telephone line for interstate business without a local franchise. The matter was taken into court by the telephone company, upon an injunction suit, to restrain the city from cutting its poles and wires, and was decided adversely to the company. The court censured the company for endeavoring to conceal, by omission, the amount of business actually transacted at Pomona, and claiming to be a telegraph company by virtue of the taking of telephone "repeats" of telegraph dispatches. This, the court held did not constitute interstate traffic, the company merely acting as "messenger boy" for the telegraph company. The company will now have to secure a franchise under the state law, which compels public service corporations to pay a tax of 2 per cent on their gross earnings. Incidentally, this tends to even up the burdens of competing companies, the Independent organizations having been steadily subject to the 2 per cent tax.

The Doctrine of Definiteness.

It was in an exchange in a small town. Line No. 158 was crossed with No. 381. Both ran through about 200 feet of cable, after which they were on the same pole line in open wire, for six blocks, to the pole where No. 381 dropped off to its substation. The other line was considerably longer. The troubleman was sent out to clear it, with instructions to follow 381 from the substation back to the office.

After having been gone a reasonable time he returned and reported all clear. A test showed the same trouble to exist, and that it was outside the office. He was immediately sent out again to go over the same ground. This time he was gone longer, but when he returned the lines were clear.

When asked why he failed to get it the first time he replied, "The first time I traced it I followed the whole lead and looked for a cross. I thought I could catch it that way. The second time I got the positions of 381's wires and followed them alone. I paid no attention to any other wires at all. That's the way I got it."

This troubleman found out what each of us has found, or must find, that if we are to succeed we must concentrate our efforts upon something definitely. Haphazard work *may* hit the mark, but it is more likely to miss it. And the trouble with the business is that work begun in the wrong way is so likely to continue that way. If a man gets the habit of fooling around indefinitely, hoping that by accident he will do the right thing, he is very likely to continue the practice all his life. He who might have been a success is made a failure.

An official of a telephone company called a new inspector into his office and asked him to draw off, from memory, the diagram of the interior wiring of a telephone instrument. This the young man did correctly. Then the official told him the reason for the test.

"We have had so many men who were attempting to do our repair work by guess, without knowing what they were doing, that I have got tired of it. They go up to a telephone, fuss around it, here and there, and expect to get it to working. If it fails, they say the instrument is worn out, pull it out and put in a new one. We have a permanent place for you, for you seem to know what you are doing."

Definiteness is of value everywhere. Not alone the technician, but the man in the business end of the telephone work can profit by its aid. As a rule every great life has been dominated by some great and definite object. Much work has to be done as a matter of routine that seems not to form a part of that great object, yet the definite desire is not forgotten. Herein is one of the true tests of greatness, for the small minded man is swamped by the routine and forgets the main issue. "These ought ye to have done, and not to have left the other undone."

The Telephone and the Railroads.

It is safe to say that the operation of the modern railroad would be an impossibility without electrical means of communication. If no such means were available, reliance would have to be placed on schedules, as is done now by small, low-grade street car systems. Where the speed of cars is low there is not much danger. But with modern conditions, including high speeds, the schedule plan would fail utterly. Means must be had for instant control at numerous distant points.

About the time that American railroads began their development the telegraph was the only electrical means of communication adaptable to the dispatching of trains. It was adopted, and for many years it has served its purpose faithfully. Business has a way of developing in accordance with the means at hand for doing it. While this often directs affairs along narrow lines, the limitations of the means are in many cases not felt. So the railroad business has developed around the telegraph. But the day of that instrument is passing.

When first announced to the world in 1876, the telephone was little more than a scientific toy of great interest and promise. Even for years afterward it could not be relied upon for communication over long distances. Transmission showed a tendency to be weak and indistinct, and the system had a habit of getting out of order which was very discouraging. Hence it was totally unsuited for railroad work.

But the telephone has moved on. Every part has been made better, so that speech transmission is louder and more distinct, and more reliable over long distances.

Many times in recent years the telephone has been seriously and urgently proposed to displace the telegraph for dispatching trains. Among the obstacles which have been raised is that it would do away with high-priced help, since anyone without previous training could use a telephone. Months and years are required to become a good telegraph operator. Indeed, not every man can pick up the art. He must begin when young, and keep at it, if he desires to become a first-class operator.

A close examination into the duties and requirements of railroad operation will relieve any person of the fear of materially lowered wages. What the railroads need is men to help operate the railroads, not merely telegraph operators. It takes just as much brain as ever to run trains, and the railroads will have to pay good salaries to get men of reliability, in whose hands the loads of freight and human beings will be safe.

It has been a marked difficulty in the past to get good men for the smaller offices, men who were expert both in telegraph and the general business of the company. A man might be a first-class operator, but lack the necessary tact for dealing with the public. Or he might meet the public properly and handle the business correctly, but be poor at the key. The introduction of the telephone will make it possible for the railroads to secure as agents men of good general qualifications who will not be barred by lack of technical skill called for by the telegraph. This will result in better service to the public and better standing for the railroads.

Misinformation vs. Facts.

On other pages we present statements about Independent companies which their competitor has included in a list of "Independent telephone company failures." Without exception, our statements were obtained from trustworthy men, each close to the seat of operation of the company on which he reports. It is the duty of every Independent manager, and to the interest of every Independent company, that the truth here presented be given the widest public circulation.

The Directory from the Operating Side

By John Putnam

Illustrations from Photographs by the Author.

Each department of a telephone company has a certain record which is of supreme value in facilitating its work. In the business, or manager's office, the subscribers' ledger is the book most consulted; the wire chief and his men constantly refer to the cable record; and certain operating room employees have the exchange directory open throughout the twenty-four hours of every day. This book is the one most carefully watched by the man in charge of the traffic of the exchange. He and his staff, during the few days preceding the appearance of a new directory issue, are anxiously anticipating its arrival from the printer. As

Information Bureau Operator Referring to Loose Leaf Subscribers' Directory.

soon as it is received preparations are made, and a force is brought in to change switchboard markings on the night before its distribution, and all in the operating room breathe a sigh of relief when the public begins to use the new book.

Accuracy in the directory information, a feature of such importance to the operating, depends largely upon the careful co-operation of other departments. Various methods of preparing new issues of the directory are in force among different companies. One is to have the local manager, under a geographical organization line-up, send daily or weekly reports to a directory department, where a force of clerks compiles the directory from them. Another is to have a small directory department, and to let the manager or chief operator hand in sheets ready for the printer when it is desired that the directory be issued. The labor of working up the directory can undoubtedly be turned over to the operating room clerks without greatly increasing their burden or adding much expense to the company. Checking of each issue invariably should be done by the chief operator or one of his assistants.

Three ways in which directory changes may be called for are as follows: canvassers' slips, made out at the time of taking the contract; by a memorandum from the chief operator's superior; and by a so-called "cut slip" made out by the wire chief or chief operator.

Each of these methods may be carried on in an automatic, accurate system by the use of proper forms, and routine for handling them. For example, each canvasser carries slips like that shown in Fig. 2, and at the time of taking a contract for a telephone, has a form made out covering the directory entry. It is preferable that the subscriber shall be required to fill in this form in his own handwriting. Then there can be no further dispute over the form of the listing. The reader will notice that the form shown with this article may cover the placing of a new station, a change of service, or a new address. It is in two parts, one of which may be sent along for filing with the contract. This form, upon receipt by the manager, is sent to the head of the operating force at the proper exchange, who, in turn, hands it to the chief operator. It is then given to the chief operator, who sees that it is pinned to the order to install the telephones and files it in its proper place in an alphabetical file devoted to these forms. When the order is completed, it is detached from the installing order, entered upon all the operating room records, and again alphabetically filed until the issue of the directory, when the orders are bundled up in order and put away in storage; being saved for a period long enough to be available until the lapse of sufficient time to make it unlikely that any complaint will be received on the directory to which they relate.

Among the records upon which the order is entered are the sheets that go to the printer. These are simply blank sheets of paper, each of which has a column of the directory pasted on one side. A sample of one is shown in Fig. 3.

Another way in which orders affecting the directory may reach the operating head of the local exchange, is by memorandum from his immediate superior. It is needless to say that a verbal order for a directory change should never be given or, if given, should not be carried out unless confirmed in writing. These memorandums may be in any form, and should be filed alphabetically by subscribers'

August 15-1908

To Manager

Pekin Division

Name James Smitte

~~Business~~ h

(If residence station designate by an "R")

Address 50 Main St.

New Station ~~Business~~

~~Change of Service~~ Residence

Upon receipt of the order for this station please see that so far as possible the station is entered as requested in the next Directory.

THIS IS NOT A PART OF SERVICE CONTRACT AND MUST NEVER BE CONSIDERED AS SUCH.

Name James Smitte

New Station h. 50 Main

~~Change of Name~~

~~Change of Service~~

Signed J. Jones Canvassing Agt.

Fig. 2.—Form Used by Canvasser in Making Out a Directory Entry.

names. These, like the canvassers' form, may be kept in a file by themselves until the date of issue of the directory, when they should be bundled up in order and put away.

A third way in which changes may be demanded in the directory is by the wire chief or chief operator to meet

plant or traffic necessities. Orders for these changes are made in duplicate on a form such as is shown in Fig. 5. In the language of the terminal room, it is known as a "cut slip." These are filed in a third file, alphabetically, by subscribers' names. When the wire chief completes a "cut", usually upon issue of the telephone list, he sends his copies of these slips to the chief operator, who matches them with

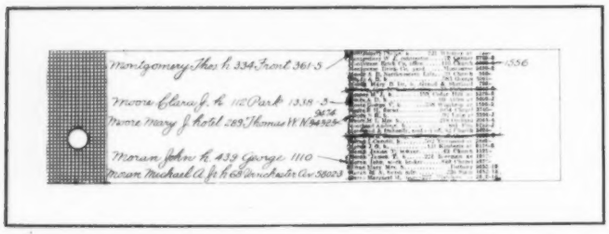


Fig. 3.—Directory Sheet Ready for the Printer.

the copies, he has, and enters the charges upon his records. This form may also be used for an intermediate frame change.

In connection with handling the directory in the operating room, the subject of a directory for the information board operators naturally arises, and will be taken up here because the proof sheets for the printer are made in the same manner as the leaves for this directory. The idea of having a card list of current changes filed in a hole, having a sliding cover, in the middle of the information desk is, or ought to be, a dead one. It is a safe wager that the designer of this style of desk never worked on one, or he would have realized how difficult it is to write on a log record resting upon a hole. The information operator when she wants to refer to a directory, needs the whole book at once. It is a great loss of time to compel her to refer to one list, and then another, and possibly a third.

The loose leaf book comes nearer to filling this need than any other form of record. Leaves are made of a good quality of light bristol board, and one edge is backed with linen. Through this edge the holes are punched for the rings of the loose leaf binder. This binder should be very strong and covered with canvas or, better, leather. The rings should open and close with a strong and positive action and should be heavy and rigid. The loose leaf cover known as the "Rotamatic" more nearly fulfills these conditions than any other which the writer has seen.

Columns cut from the directory are pasted at one side of these leaves, leaving a wide margin on the side against which the subscribers' numbers come. On these margins all corrections are made in red ink. Names of new subscribers are written opposite the places which they will take in the book, with arrows pointing out the line of insertion. Changes in name and occupation are made by crossing out that part of the entry which is obsolete, continuing the line out into the margin, and writing over it the new entry. Changes in address and number are made in the same manner, but in the margin opposite. One point must be noted to avoid confusion. On the printer's copy of the directory, which is made as above, a change of name but not of number necessitates the crossing out of the name entirely and its insertion perhaps several pages away. In the information desk book, the name only is crossed out and the words, "see———" (the new name) are inserted.

Each entry should show a subscriber's business, or the designating letter h for house, or r for residence, as preferred. If the name of a firm indicates its business, such as "Pekin National Bank," that would be sufficient. The word "office" should not be used except in case of failure to secure a better listing.

Most companies limit their subscribers' entries to one line. This puts a limit upon the number of characters which may be used in a directory entry, and must be taken into consideration when the subscriber writes out his listing. Some people seem desirous of telling their life stories in the telephone directory, and it is possible, by a judicious use of consonants, to get a part of it in. Sub-headings, i. e., a firm's name at the top and then its different branch stores or offices, are allowed by some companies for a certain number of telephones. In these cases the names under the sub-head should not contain the name in the head. Pay stations are, as a rule, allowed no business entry. If a subscriber has a residence telephone, he should not be allowed to have a cottage name like "Smith, John, Uneeda Rest Cottage." It may be a hotel or boarding house. Street numbers should be given in addresses, and not names of buildings, while the abbreviation "st." for street may be omitted, ave., being used for avenue, pl. for place, etc., thus leaving the word street understood. The above hints are simply given as examples of good practice in making up a telephone directory.

The sheets to be sent the printer as proof for the directory are made like the leaves of the information desk book, except that they are without the perforated linen edge. They are kept up to date from hour to hour until such time as the directory department calls for them. However, certain entries appear in the information desk book that the printer's sheets do not have. For example, one might mention non-listed telephones, i. e., telephones belonging to subscribers who have ordered their numbers not to be given out. These are inserted in black ink. Entries for the information of the operators, such as "Pekin New Theater" which might be listed under "Doe, John, Mgr. Pekin New Theater," are written in green ink. Just how far this practice should be carried is a question. The more of it there is, the less revenue will the telephone company receive from duplicate entries. If the proprietor of the "Pekin Theater" wishes people to find his telephone number he has the privilege of paying a small sum yearly for as many different entries as he cares to have. It would appear

NOTICE OF MAIN / INTERMEDIATE FRAME CHANGE

MAINTENANCE DEPARTMENT

No....123..... .....August 1st.....19..08.

To Wire Chief.

[redacted]

Change Sub. No.....519.....on

.....Issue of Directory.....19.....

From	Drop No.....519.....	Panel No.....9	Jack No.....19.....
To	Drop No....1021....	Panel No.....19.....	Jack No.....21.....

.....J. P.....

Manager or Chief Op.

Lamp cap changed.....19.....by.....

Number plate moved .....19.....by.....

Change made.....August 21 .....19..08..by.....A. B. C.....

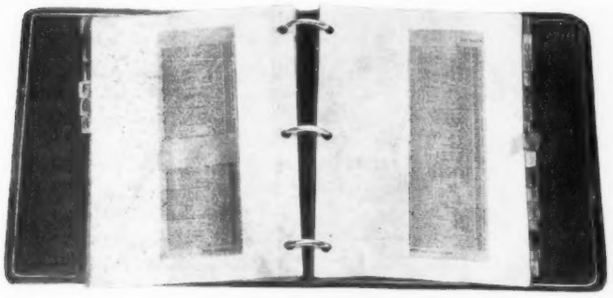
Entered.....".....".....19..".."..by.....D. E. F.....

NOTE. On completion return this form to Manager or Chief Operator, as directed.

Fig. 5.—Form Used by Chief Operator and Wire Chief to Give Orders for Main or Intermediate Frame Change.

preferable, then, to restrict this practice as much as possible, giving the information operator only such entries of this kind as are absolutely necessary to the smooth conduct of the business. The reader will notice that the loose-leaf book for the information desk has an alphabetical index, consisting of linen letters glued to the edges of the proper leaves. These may be bought at any stationer's store for

fifteen cents, and are a great help in reference. Before sending the printer's sheets to the directory department, they should be cross-checked for all changes with the information desk book, to make sure that all entries in that book are on the proof. An additional reason for this check is that errors are very likely to be quickly discovered in the "information's" directory, because of its constant use in reference. Then they may be checked with the various memoranda that were sent in with the duplicate cards, with the "cut slips" covering the wire chief's changes



Loose Leaf Subscribers' Directory Used in Operating Room.

and finally, any orders assigned but not yet placed may be inserted in the proof, and it is ready for the printers. Upon its departure from the operating room a new set of sheets is immediately started.

These sheets show what changes are made between the time of the books going to press and the receipt of the proof that is returned before the final printing. When the proof, or "revise," comes back, it is checked with the original copy for any printer's errors, and then the changes which are on the current directory sheets are added. "Advance assignments," or names and numbers inserted in the directory before the instruments are installed are then put in, and the copy makes its final return to the printer.

As to the advisability of these so-called "advance assignments" there might be endless debate. From the traffic standpoint, they are a nuisance, as the operating room has to carry them on its records as "not placed" until the installation of the telephones, and has to so report to any subscriber calling for these numbers. During such an interval, the prospective subscriber may change his mind about having service. He may move away, or drop dead, but he is in the telephone directory and acquaintances will try to call him. Looking at the question from a commercial view-point, it is undoubtedly a considerable inducement to many customers to have their names catch the directory. It may get some people to sign contracts who would otherwise delay, or not sign at all. This is what telephone companies are in business for, to get subscribers and sell their service, and so to increase the rental account and the income from tolls. The advantages of argument over this question would, therefore, appear to be rather on the side of the contract man than with the chief operator.

The Working Value of a Surplus.

Surplus to the manufactory is what seed and fertilizer are to the farmer—it is the business life insurance policy. A concern that has stock to sell, and that is really a stock jobbing enterprise, will vote its surplus into the dividend; but the intelligent investor will be more impressed with a wholesome reserve than by forced premiums. A reasonable surplus at once suggests to all; to the man seeking a fair investment, to the bank looking for a new customer that it may recommend to houses that wish to know the goods they sell will be paid for, and to the state that wishes to foster its enterprises, that those in control are men of experience and honesty of purpose.

The amount of surplus that a concern should keep on hand must naturally be regulated by the nature of its work, the amount of capital invested, and the average cost of operation as figured during ordinary periods. There are several qualifying conditions. The greatest of these is hazard, the degree to which the element of chance enters into the undertaking. The possibility of great loss is a feature that must be considered in the conduct of many legitimate industries and the manufactory that has this question confronting it must carry a heavy percentage of reserve, even at the cost of expansion and increased facilities; if they would have a long and healthy life.

No industry may advance to any prominent position without the aid of at least one bank. And the bank, to be able to render the proper service, must be sure of the strength of the customer. Bankers are often questioned regarding their depositors when the depositor knows nothing of it, but the result of such an interview may have a most positive effect on the earnings, and even on the standing of the business under discussion. —*Henry Clews, in American Industries for September.*

THE MANAGER'S SOLILOQUY.

(By Leonard Young.)

To fight, or not to fight—that is the question:
Whether 't is better that stockholders suffer
The mandates of an old outrageous franchise,
Or take up arms 'gainst council of the city,
And, by opposing, beat them? To scrap—to fight—
To law; and by a lawsuit say we end
The low rates and the consequent abuse
That we fell heir to. 't is a consummation
Devoutly to be wish'd. To scrap—to fight—
To law! perchance to lose! ay, there's the rub;
For in the pinch what friends of ours may fail
When we have parted from our hard-earned coin,
Must give us pause: there's the respect
That makes calamity to lose good will;
For who would bear the low rate ordinance,
The franchise law, the city council's will,
The pangs of postponed dividends alway,
The insults of the mayor, and the slurs
That business men with pleasure seem to make,
When we ourselves might end this sorry state
By a new franchise? Who would burdens bear,
To slave and work under an income small,
But that the dread of some new company,
Whose undiscover'd pull may get the grant
For a brand new franchise, puzzles the will
And makes us rather bear those ills we have
Than fly to others that we know not of?
This city council does make cowards of us all;
And thus our near resolve to go to law
Is sicklied with the reasonings of thought,
And costly law suits of much pith and moment
With this regard their currents turn awry,
And lose the name of action.

Play Advertising by Telephone.

Theater managers in several cities have resorted to the telephone in advertising plays. The scheme, which was first used by the management of Weber's Theater in New York City, is to call up every subscriber whose name is listed in the telephone directory and use a set form of message in apprising the called party of the play and concluding with an invitation to be sure to see it. In elaborating the scheme, lists of the newly arrived guests at all the hotels were secured and messages were given them over the telephone. This novel method of drawing attention to plays is being used by a number of progressive theater managers.

Managing Schools by Telephones.

From Waynesboro, Penn., comes the report that the public schools will be managed and directed by telephones for the coming month. The reason for this is that a son of Professor J. H. Reber, the superintendent of public schools, has scarlet fever, and the health officer has ordered the house quarantined, thus shutting in with this family the head of the Waynesboro schools. As the scarlet fever germs can not be sent over the wires, the professor will be allowed to use the telephone, and it is believed that he will be able to successfully direct the school work in this y.

Conduit Construction—Methods and Cost

By Clarence Mayer

For the information of those who have never given conduit work any thought, a brief description of the kinds of duct now used may be pertinent.

The most prominent kinds are (1) single duct tile, (2) multiple duct tile, (3) sewer tile, (4) creosoted pump log, (5) fibre conduit, (6) cement or stone conduit, (7) iron pipe.

Single duct tile, while used in single duct conduit construction, is now rarely used for multiple duct telephone conduit, on account of the expense of laying. This tile is laid in a matrix of cement upon a foundation of 3 ins. of concrete and covered on sides and top in like manner. It is flexible in weaving around and over pipes in congested districts and for this reason it may be used where the use of multiple duct tile is impracticable. Except in lateral construction, usually where conduit is installed the ultimate use of a 2-duct or larger multiple is highly probable, and it is poor policy to install single duct conduit as the cost is almost as great as for 2-duct conduit. In building up a multiple conduit, multiple duct tile is preferred to single duct tile, except in congested districts, on account of it requiring a smaller volume of concrete and, consequently, less labor to install.

Multiple duct tile is laid either in an encasement of 3 ins. of concrete, or on a foundation of 3 ins. of concrete, on top of which the tile is placed and covered with 2 ins. of earth, which in turn is covered with a 1½-in. creosoted plank of the width of the formation. The tile is made in 2, 3, 4, 6, and 9-duct multiples; the 9-duct, however, is rarely used on account of its weight which makes it difficult and expensive to lay. On account of the flat surfaces of multiple duct tile there are no interstices between tiles to be filled in with concrete as is the case with either octagon or circular shaped ducts; and, therefore, in building up a large conduit, multiple duct tile does not need as large a trench or as much concrete or labor as is the case where other shaped ducts are used.

Where a single duct conduit is required, as is usually the case in lateral construction, 3-in. sewer tile is generally used. It is laid in the ground without special foundation, the joints being covered with concrete or cement mortar, on top of which is placed 3 ins. of earth, which is covered with a creosoted plank. This is a cheap form of single duct conduit. Other advantages are that the tile is carried in stock by building supply houses in almost every town, and it is made in curved lengths such as required in lateral construction at the point where the lateral takes separate trench and, also, at the butt of a pole in cases where a lateral extends up a pole. Unless encased in concrete which, on account of its bell joints bridging the parts between joints, would mean the use of a greater volume of concrete than for any other duct, it does not form as permanent a structure as vitrified clay tile. Its use should be confined to laterals installed in side streets, alleys and other places not subject to frequent excavations.

Creosoted pump log is generally laid without any special foundation, and is usually covered with 3 ins. of earth, on top of which is laid a creosoted plank. Each log is provided with mortise and tenon. This class of duct makes a cheap and durable conduit, and is preferable to other duct for use

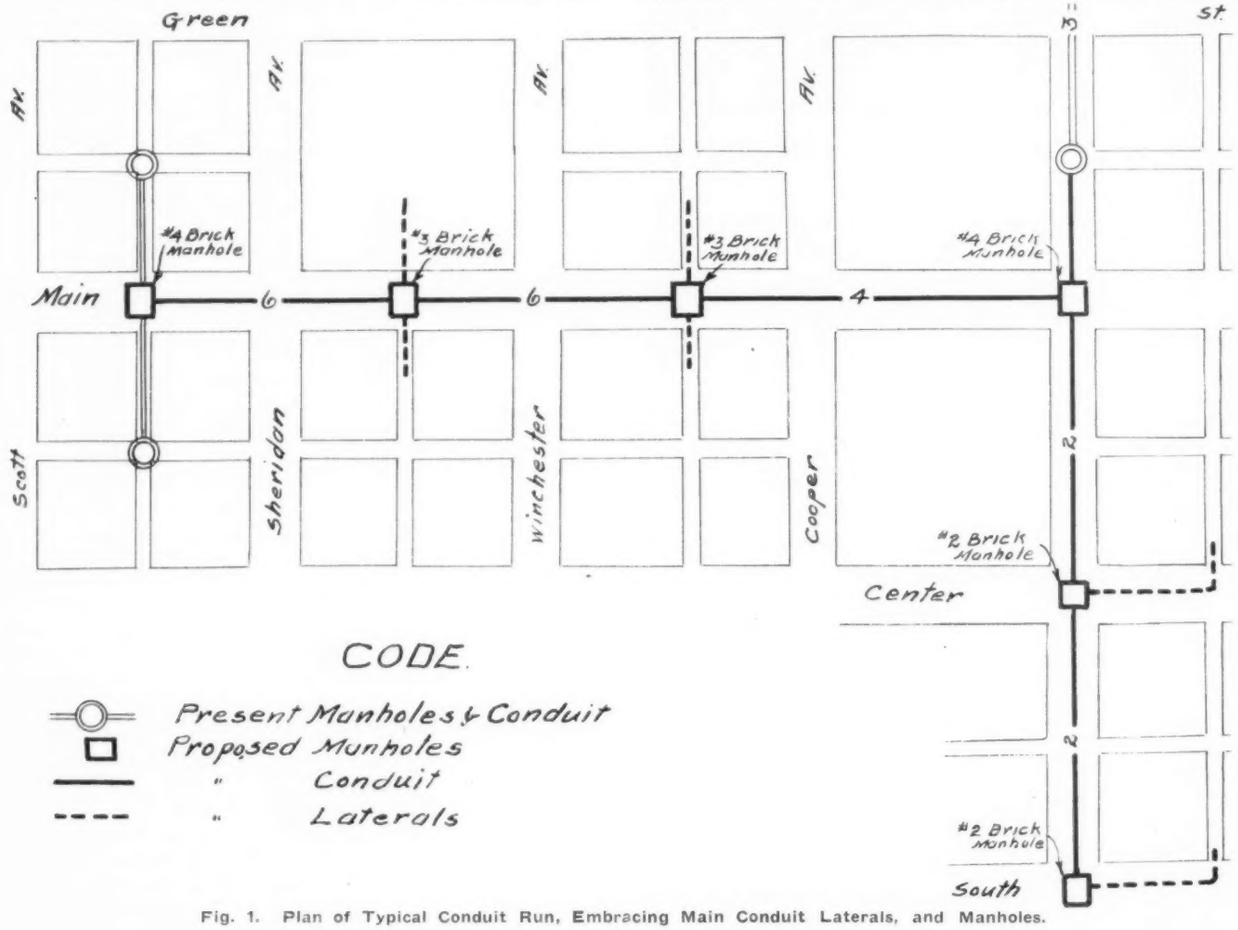


Fig. 1. Plan of Typical Conduit Run, Embracing Main Conduit Laterals, and Manholes.

in wet soil and places where conduit is subject to frequent shocks, such as are encountered in yard of some manufacturing plants.

Cement or stone conduit and fibre conduit are laid in several different ways. One method is to set forms in positions, which are to act as a foundation and encasement, before the ducts are

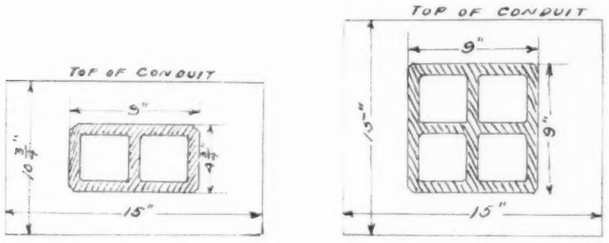


Fig. 2. a, Dimensions of 2-Way Conduit; b, Sizes of 4-Way Duct Unit, and Enclosure.

placed, the ducts being separated both vertically and horizontally by strips of wood. The space between the side walls and around the ducts is filled with cement grout, and the top is covered with concrete, care being taken to see that the lengths butt solidly together within the aligning collars. The space between ducts is filled in with concrete and the entire formation is enclosed at sides and top with concrete. If the conduit is of large cross section it is built up in tiers, the formation being built up to its complete size and retained in formation by stakes driven into the bottom of the trench. On account of the interstices between ducts, incident to all circular ducts, these varieties require the use of more concrete in building up a multiple conduit and, therefore, cost more to install than multiple duct tile. However, their use is advantageous where a large cross section is built in a street where many pipes and conduits cross the line of the trench, as the conduit may be installed so that part of the ducts are laid under and part over the intersecting pipes, this materially reduces the depth of trench.

On account of its cost, iron pipe is used only in extending laterals up poles, for conduits crossing bridges and in cases where on account of peculiar conditions no other ducts is practicable.

In this article only methods and costs of multiple duct tile conduit with 3-in. sewer tile laterals and manholes corresponding are given.

The job shown by the accompanying Plan, Fig. 1, is chosen

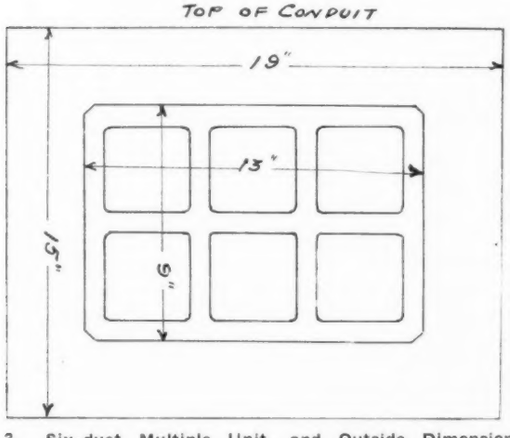


Fig. 3. Six-duct Multiple Unit, and Outside Dimensions of Conduit.

for the purposes of this article for the reason that it includes the three divisions of conduit construction—main conduit, laterals and manholes, and also because the cost was kept in great detail by a special cost man on the ground. The work was done in a city of 25 thousand population, and its cost will average with the cost of similar work in other small cities.

CONSTRUCTION DETAILS.

In the work on which the following data are based, the tile used for main conduit was vitrified clay tile; 3-in. sewer tile was used for laterals, and manholes were built of brick with concrete floors and roofs.

Materials for Main Conduit Construction:			
1620 duct ft. 2-duct vitrified clay tile	@	$.04	$64.80
2304 duct ft. 4-duct vitrified clay tile	@	.04	92.16
4320 duct ft. 4-duct vitrified clay tile	@	.04	172.80
1100 dowel pins, per hd.,	@	.32½	3.58
650 yds. burlap 6 ins. wide	@	.014	9.10
78 yds. concrete	@	3.63	283.14
100 ft. common lumber per M.	@	25.00	2.50
Materials for Manhole Construction:			
6650 bricks per M.	@	8.00	53.20
6 yds. mortar	@	5.19	31.14
6 cast iron frames and covers	@	12.30	73.80
38 ft. 6-in. sewer tile	@	.09	3.42
6 sewer traps	@	1.38	8.28
6 drain plates	@	.22	1.32
Material for Lateral Construction:			
760 ft. 3-in. sewer tile	@	.05	38.00
8 3-in. sewer tile curves	@	.40	3.20
12 ft. 3-in. iron pipe, 2-ft. lengths	@	.27	3.24
72 ft. 2-in. iron pipe, 12-ft. lengths	@	.12	8.64
6 pipe reducers	@	.82	4.92
14 pipe hooks	@	.10½	1.47
760 ft. 1½-in. x 9-in. creosoted plank	@	.0597	45.37
½ yds. cement mortar	@	5.19	2.60
Total Cost			$906.68

Note:—The cost of concrete is based on cement $1.73 per bbl., sand and gravel $1.65 per yd. delivered on the ground.

Table I.—Quantities and Cost of Materials.

The trench for main conduit was excavated to such a depth as to leave between the top of the concrete over the conduit and the grade of the street a distance of 24 ins. The width of the conduit is shown in Fig. 2, *a* and *b*, and Fig. 3. The trench was prepared with a foundation of 3 ins. of concrete.

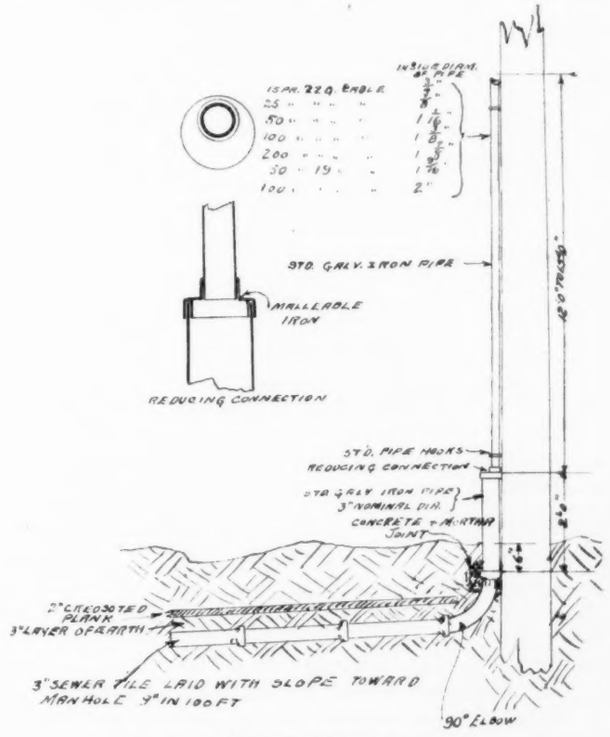


Fig. 4. Method of Taking Off Lateral.

Upon this the tile was laid, dowel pins being used to center the tile and preserve alignment. The top and sides of each tile joint were covered with a strip of burlap 6 ins. wide to prevent the entrance of concrete into the duct, and all joints were staggered. The formation was enclosed at sides and top

with a wall of concrete 3 ins. thick. The formation for the different size conduits are shown by Figs. 2 and 3. The trench for lateral conduit was wide enough to permit convenient laying and of sufficient depth to make the completed lateral with its protecting plank 13 ins. below the grade of the street. crete roofs 17½ ins. below street grade. The designs and dimensions of manholes and method of construction are shown in Fig. 5. The walls were 9 ins. thick, and were built up, every sixth course being laid as headers, to the required height. The horizontal mortar joints were ½ in. and the vertical joints ⅜

No. of Lineal Ft.	Conduit Cross Section.	Kind of Soil.	Teaming.	Excavating.	Mixing crete and Dumping into Trench.	Laying Tile and Concrete.	Filling In.	Supervision.	Total Cost.	Average Cost Per Lin. Ft.
810	2 Duct	Clay	$21.87	$43.01	$23.17	$11.34	$34.47	$24.54	$158.40	$0.1956
576	4 "	"	20.16	71.48	26.61	17.97	21.31	19.90	177.43	0.3080
720	6 "	"	20.88	95.11	38.88	22.32	57.67	35.50	270.36	0.3755
Total 2,106	3.91 "		$62.91	$209.60	$88.66	$51.63	$113.45	$79.94	$606.19	$0.2878

Table II.—Total and Average Labor Cost of Main Conduit Construction.

No. of Manhole.	Size of Manholes.	Kind of Soil.	Teaming.	Excavating.	Placing Floor.	Laying Brick.	Placing Roof and Frame.	Supervision.	Total Cost.	Average Cost Per Manhole.
2	2	Clay	$6.40	$8.82	$2.06	$21.52	$6.82	$7.08	$52.70	$26.35
2	3	"	6.86	9.20	2.36	22.84	7.38	7.22	55.86	27.93
2	4	"	7.60	11.64	2.86	28.22	11.52	8.96	70.80	35.40
Total 6			$20.86	$29.66	$7.28	$72.58	$25.72	$23.26	$179.36	$29.89

Table III.—Total and Average Labor Cost of Manhole Construction.

No. of Lineal Ft.	Conduit Cross Section.	Kind of Soil.	Teaming.	Excavating.	Laying Tile, Plank and Concrete.	Filling In.	Supervision.	Total Cost.	Average Cost Per Lin. Ft.
760	1 Duct	Clay	$11.91	$35.04	$12.31	$19.61	$23.94	$102.82	$0.1353

Table IV.—Total and Average Labor Cost of Lateral Construction.

Joints of the tile were protected with concrete. Over the lateral was placed 3 ins. of earth, free from large stone, on top of which was laid a 1½ in. x 9 in. creosoted plank to prevent injury from subsequent excavations. The method of ex- in. in thickness. Cement mortar was mixed in the proportion of 1 part cement to 3 parts sand.

Concrete was mixed by machine. The proportions of concrete mixtures for the different purposes was as follows:

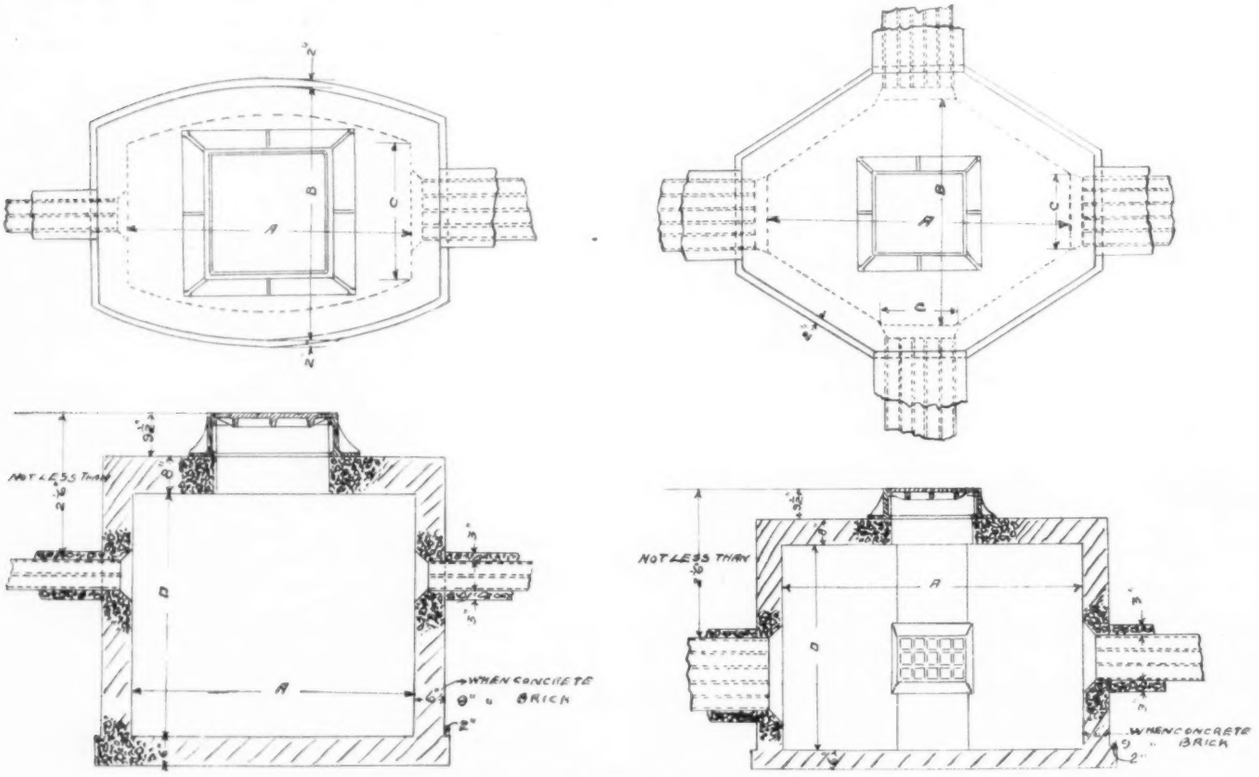


Fig. 5. Manholes for Which Costs in This Article are Computed.

tending a lateral on a pole is shown in Fig. 4. Laterals drained toward the manhole with a slope of about 9 ins. in 100 ft.

Manholes were built with concrete floors and roofs and cast iron frame and cover. The long dimensions of the manhole were in the line of conduit. The excavation for a manhole was made to such a depth as to bring the bottom of the con- For trench and floor of manholes—One part American Portland cement, 4 parts ¼ in. screenings and 8 parts ¾ in. stone. For roof and sides of manholes:—One part American Portland cement, 3 parts ¼ in. screenings, and 5 parts ¾ in. stone.

In the accompanying tables, "cost of unloading and distributing material," includes teaming and labor cost of unloading

cars containing duct, cement and frames and covers and distributing them on the work. Other material was bought delivered on the work. Under "supervision" entered the cost of foreman, assistant foreman, timekeeper and watchman.

The rates of wages paid for a 9-hour day were as follows:

Foreman	$3.75	Watchman	$2.00
Assistant Foreman	2.85	Laborers	2.00
Timekeeper	2.25	Teams (with driver)	4.50
Bricklayer, per 8-hr. day	4.80		

Tables 1, 2, 3 and 4 give respectively the items and cost of material, total and average labor costs of main conduit construction, total and average costs of lateral construction and total and average costs of manhole construction. In these tables the cost of each part of the work is separated in such a manner that the data may be analyzed. This system of cost keeping has many advantages, especially in comparing and estimating costs. This may be seen if we consider that as the cost of excavating is separated in the data, the record may be used in comparing or estimating the cost of work where character of soil differs. Again, it is obvious that where two or more construction methods of excavating, laying tile, mixing concrete, or back-filling, are under consideration, nothing definite can be known where no costs or lump costs were kept. On the other hand, if in the system of cost-keeping data is kept separately on the cost of each part of the work, the question whether on large jobs in unpaved streets it is cheaper to back-fill a trench by shoveling in the earth and tamping, or by scraping in the earth by team and scraper and running a heavy roller over the trench and questions of like nature, may be decided beyond a reasonable doubt.

Hints on Soldering

By Wm. R. L. Dwyer

Success in soldering depends in the first place on having a copper adapted to the work in hand. It is useless to try to solder any heavy object with a small copper as the heat will be conducted and radiated away from the copper so rapidly that it becomes too cold to work with before the solder has been heated enough to properly unite the parts. This usually causes the workman to smear the solder on with the tip of the copper, instead of holding the copper on the work until the solder is hot enough to flow smoothly into place.

On the other hand too large a copper, besides being unwieldy, is liable to burn the insulation, or tinsel, in case cord tips are being soldered, or to melt and ruin insulating material near the joint.

Most troublemen and installers prefer to have several coppers of different sizes and shapes, each adapted to a particular kind of work. Probably the best size to use for all round work is what is known as the 1½-lb. copper. Soldering coppers are sold in pairs, and a single copper of this rating actually weighs ¾ lb. There is considerable difference of opinion as to the proper shape for the tip of the copper, but the writer has found the form shown in Fig. 1 to be the best for general use. This copper has the end bent over approximately at a right angle to the body, and the tip is flattened enough to permit it to be inserted freely between the terminals on jacks,

Fig. 1. Form of Soldering Copper Well Adapted for General Use.

cross connecting boards, etc. The reason for bending the end of the copper over is that when working with a straight copper in close quarters, as in soldering cross-connecting wires to the clips on heat coil protectors, if there are several strips of protectors mounted on angle iron frames, it is very difficult to get the tip of the copper up to the clip, especially if the handle of the copper is long. With the form shown this difficulty is overcome. The copper can be brought to this shape by heating the end, hammering it out, and finishing with a file.

The next step after the choice of the proper size and shape is to get the copper properly "tinned." Put the copper on the fire, which may be a No. 0 size single burner "hot plate" if gas is available, or if not, a gasoline blow torch or furnace may be used. A soldering copper should never be put into a coal fire as the sulphur fumes given off attack the copper, and will soon burn off all the tinning and cause deep pits to appear. It is impossible to retin the copper properly unless the pits are filed or hammered out. After placing the copper over the fire, wait until it gets to a dull red heat, then take a rather coarse file and clean the tip until it is bright and smooth for about an inch back from the point.

A lump of sal-ammoniac about the size of a small marble should be ready to hand, placed on an old piece of tin or board. The writer prefers a piece of tin on account of the pungent smoke rising from the burned wood if a board is used. Dip the copper in the sal-ammoniac and work it about rapidly until it is thoroughly coated. A piece of bar or wire solder can then be applied to the heated copper. As soon as the solder melts, work the tip of the copper around in the melted solder and sal-ammoniac until the solder sticks to the copper at all points where it was cleaned with the file. Now quickly wipe the surplus solder off the copper with a piece of old cloth, and the job is done. It is surprising to see how easy it is to tin a soldering copper properly by this method. In actual practice it only takes a few minutes' time, which is more than made up by the time gained as compared with attempts to solder with a copper that has never been tinned, or has had the tinning burned off, so that the solder will not stick and run as it should. Rosin core or other self-fluxing solder does not give good results in tinning a copper, and should not be used.

For use on switchboards, instruments, cross connecting boards or any other apparatus having tinned clips, there is undoubtedly nothing that equals the well known rosin core wire solder. The only objection to this is that unless the copper is at the proper heat, and held on the work until the solder flows, one is liable to have a "rosin joint" instead of a soldered one. These "rosin joints" are a prolific souce of cut-out troubles, and are difficult to detect with the eye from a good soldered joint. They will never be made, however, with a copper properly tinned and heated. Rosin core wire solder can be purchased in two forms, flat and round. The flat shape is commonly used for switchboard or other work where an excess of rosin is to be avoided, and the round, which contains considerable more rosin is to be preferred for general purposes.

There are also other varieties of self-fluxing wire solder on the market. One kind contains tallow instead of rosin and is used by cablemen on lead cable sheaths and for soldering the lugs or bus bars on storage cells.

Another kind contains a flux similar to the regular commercial "soldering paste" which is prevented from running out of the hollow tube or wire when it is heated by the copper by having the tube "nicked" or "dented" about every one-eighth of

an inch, thus forming little cells which contain the flux. It will be readily seen that when the heat is applied the flux can only run out of the cell which has had the end melted off, so there is no waste. This form is also made up with rosin in the cells.

In addition to the self-fluxing solders, there is the ordinary solder which contains no flux and is on the market in pigs, bars, triangular strips and wire of various sizes. In using this solder, flux of some kind must be applied to the object to be soldered. There are a number of soldering pastes, soldering sticks, compounds, and salts on the market, some of real merit, and a great many that are worthless. Here are some formulae for home-made fluxes from which good results can be obtained:

An acid flux for rough work can easily be made. Procure an old battery jar, clean and wash it out thoroughly, and pour into it eight ounces of "commercial muriatic acid," sometimes called hydrochloric acid. The "Commercial Acid" is as good for the purpose as the C. P. or chemically pure, and it is a great deal cheaper. Now get an old "pencil" or crowfoot battery zinc, break off three or four pieces about ½-inch long, and drop them into the acid. In a short time the zinc will be dissolved, or "eaten up" by the acid, and, in the language of the lineman, the acid will be "cut" and ready for use. This must not be used on small wires, nor even on iron line wire, on account of the erosive or oxidizing effect of the surplus of acid which invariably remains on the joint.

Another good flux of the paste variety may be made by mixing one ounce of C. P. chloride of zinc with ½-lb. of vaseline. First melt the vaseline, and then add the chloride of zinc, mixing it with the hot vaseline and stirring the mixture until it cools, in order to prevent separation. For use, apply a little of the paste to the connection to be soldered.

The writer experienced difficulty in soldering brass tips to tinsel switchboard cords with either rosin core or other flux solders. The job would either look sticky and greasy, or else the copper would have to be hot enough to burn the tinsel before the solder would "flow." Even if the tinsel was only scorched it would not be long until it would get ragged and the tip break off.

With the following solution the work can be done satisfactorily, just a drop of the solution being used on the tip and tinsel.

Wood Alcohol	2 oz.
Glycerine	2 oz.
Chlorid of Zince, C. P.	½ oz.

Plain wire solder is used, and the copper is held on the tip until the solder "flows" through the tinsel, and unites it with the tip.

If an excess of solder is applied, give the tip a quick jerk while the solder is melted, and the surplus will be thrown off and enough remain to hold the tinsel in place. If this does not do the work a little more solution can be applied and the tip resoldered.

In soldering lead, such as lead sheathing of cables or lugs on storage cells, the edges where the lead is to be soldered should be scraped perfectly bright, and tallow core solder used, or if this cannot be procured the scraped edges can be coated with ordinary tallow and soldered with plain wire solder. It takes some practice to solder lead and make a good job, the principal difficulty being that if the workman is not very careful not to hold the copper at one point too long the lead will suddenly melt under the copper, and leave a hole which can not easily be closed up.

Many telephone men have trouble in soldering wires to ground rods. If plain iron rods are used, it will be necessary to brighten the ends making them perfectly clean for a distance of 6 or 8 inches with a coarse file. If galvanized rods are used this will not be necessary. Wrap one end of a piece of galvanized iron wire about 8 ft. long tightly around the bright end of the rod, then have a melting pot full of solder on a gasoline furnace and also have a small earthen milk crock, or porcelain Edison-Lalande battery jar full of the acid flux which has been described. Have the metal as hot as possible. Dip the end of the rod, with wire attached, into the acid for a few seconds and then quickly insert it into the pot of melted solder. If the wire has been tightly wound on the end of the rod a perfect joint will be made. Of course this would not be practical if one only had one or two rods to solder up, but a considerable number can be economically prepared in this way and used as needed.

In soldering joints in line wire with the acid flux, if the wire is old, and the galvanizing rusted off, scrape a bright place in the middle of the joint with the point of a knife, and apply the flux with the "swab." When soldering joints in line wires wth a blow torch, care must be taken not to get the wire too hot, especially if it is pulled up tight, or it will snap off where the heat is applied. It is best to use bar solder for this work, heating the end of the bar of solder almost to the melting point before holding it against the joint and applying the heat to both the solder and the joint. If this is not done the wire will get hot enough to burn off before the bar solder melts.

The main point to be borne in mind to secure good work on jobs of all classes is that the soldering copper should be kept properly tinned at all times, and the only way to keep it in this condition is to avoid heating it hot enough to burn the "tin" off and to occasionally wipe off the burnt tin, or dross with a coarse cloth.

The Last Straw.

Advertisements of telephone companies of the type intended to contribute to the education of subscribers may be a good thing. But, for example, what effect would they have on a man who had just been through the experience related as follows by the Pittsburg *Gazette-Times*. The man at the telephone had been trying for what seemed to him like an unnecessarily large portion of eternity to get "his party." He had been connected by central with persons who were total strangers to him, and had been fumbled and mussed, figuratively speaking, until at last his patience was a thing of shreds and tatters. One spark only was needed to burn-up the remnants, and it appeared in the inability of the girl at the other end of the line to comprehend the figures he was trying to talk off. After a loud noise which sounded to others in the room like profanity he shouted:

"Can't you understand anything? I want 1492—the year Columbus discovered America. Now do you know what I want?"

Then he collapsed and was laid out on a desk while the office force applied restoratives. After he had been brought out of the faint he explained:

"After that last shot the girl said: 'Oh, yes, I know now. You want one-four-nine-two, Columbus, Ohio. You should have asked for 'long distance?'"

Using the Telephone in Kansas for Political Purposes.

It is reported that the co-operative telephone lines in Dickinson county, in Kansas, are being successfully used by political spellbinders to draw audiences. Recently a speaker who arrived in Upland, found that he had not been advertised and that no arrangements had been made for the meeting. The telephones were called into use at the noon hour when all the farmers were at dinner and an emergency call was sent out on the lines connecting 2000 telephones with the Upland exchange. This emergency call brought all the subscribers to the telephone and an announcement of the meeting was then given. As a result of this unique method of advertising the speaking, a crowd was assembled which overflowed the hall.

Train Dispatching by Telephone*

By G. W. Dailey

Superintendent of Telegraph, Chicago & Northwestern Railway.

For a good many years the telephone has filled a minor, but, nevertheless, important place in the communication system of our road, as well as other roads. Its principal uses in the past have been in connecting up outlying switches with telegraph offices, small stations with telegraph stations, connecting round-houses, coal sheds, etc., and in the larger yards connecting various switch shanties, scales, ice houses, round-houses, etc., with the yardmaster's office. Notably as an illustration of such use, we have had for the last three or four years a very extensive yard system in the Chicago terminal district; the train master of freight terminals being able at all times to communicate at will with all his yardmasters; they, in turn, being able to communicate readily with all parts of their particular yards, etc.

This yard system has proved of untold value in handling the terminal business and could not now be dispensed with, or replaced with anything that would answer the purpose as well. The same system on a smaller scale has been in use in Clinton, Boone and other yards, for several years. Many important instructions are issued and hundreds of car numbers, initials, etc., handled over these yard telephone lines every day. The errors and misunderstandings have been so few and the operation of these yard lines so successful that it had quite a bearing upon the determination to extend the use of the telephone in our service. It also served to demonstrate the superiority of the telephone over the telegraph for such uses, due to its greater speed and flexibility, as well as to the fact that any yardmaster, yard clerk or ordinary employee can use it to equal advantage and does not have to look for a telegrapher to do his talking for him.

The next step was taken last year when we equipped the following districts with telephones for blocking trains: Madison Division—Harvard to Elroy, and Milwaukee to Montfort; Wisconsin Division—Milwaukee to Fond du Lac; and Iowa Division—Boone to Missouri Valley. The telegraph block instruments were taken out, telephones installed on the block wires and all blocking done telephonically since then. It has proven entirely satisfactory in every particular, and it will be noted that these districts embrace both single and double tracks with a heavy traffic.

Way Station Telephone Equipment Consisting of Swinging Desk Arm, Transmitter and Head Receiver.

The next step was taken this year when we equipped the Madison Division—Janesville to Baraboo (in operation May 31st) and the Wisconsin Division—Chicago to Janesville (in operation July 1st), with train dispatcher's telephone lines, and we are now completing the equipment of a line between Baraboo and Winona.

We will give a brief but comprehensive description of these lines and their use in train dispatching. The standard of installation and use is alike on the two divisions, and one illustration or example will cover all. Believing that the best is none too good for a train dispatcher's circuit,

*Abstract of a paper prepared for the *Northwestern Bulletin*.

the best types of wire, instruments and other material have been used, and the best workmen obtainable to install them. The line is a metallic circuit, of No. 9 B & S gage copper wire, weighing 210 pounds per mile, transposed every one-fourth mile to eliminate induction and outside electrical interference. The circuit is self-contained, that is, the signaling and talking is all done on the same pair of wires, and one does not interfere with the other.

The Dispatcher Sending Orders by Telephone.

The calling is done as follows: In the dispatcher's office is located a box about twelve inches high, eighteen inches long and three inches deep, with a row of push buttons across its face. Inside the box is a clock and three small relays or magnets, all connected.

Each push button corresponds to a certain station. Each station is equipped with a box containing a clock, two relays, two coils, four cells dry battery and a 4-inch vibrating bell, which can be heard a considerable distance, even out on the platform. The dispatcher desiring, say four stations, presses the push buttons in his box corresponding to the stations, then presses a battery button in the lower middle face of box, and the bells in these particular stations ring until shut off by the operator. They make such a racket that he is usually prompt in shutting them off and answering. By this method as many as twenty-eight stations can be called in thirty seconds. This calling being practically instantaneous, it can plainly be seen that a great saving in time is effected over the old plan of calling by the telegraph key, when it was a common occurrence to waste from fifteen minutes to an hour in calling one office. If an agent or operator is in the freight room, or out on the platform unloading freight, he can hear his bell, and we have had cases where others have heard the bell and called the agent when he was out of hearing. The result is that there is practically no time wasted in calling offices, which conserves the time of the dispatcher and enables him to utilize such time in other more profitable ways. So much for the calling arrangement.

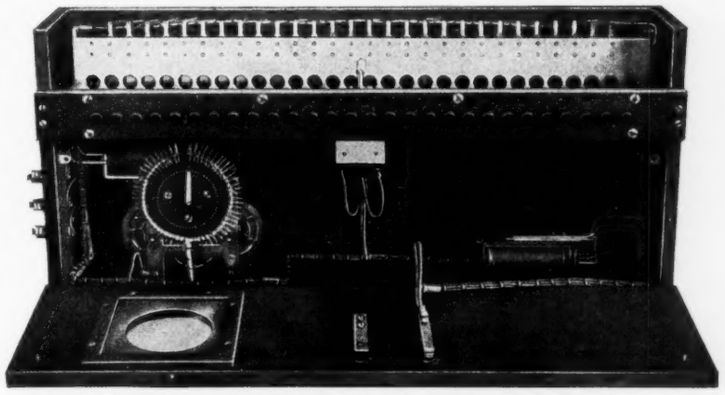
For talking purposes the train dispatcher has a breast transmitter and a head-band receiver, which leaves both hands free. Each station is equipped with a swinging arm transmitter, which can be moved into any desired position, and a head receiver, thus allowing both hands to be perfectly free while the operator is using the telephone.

The train dispatchers' circuit is for the exclusive use of the dispatcher in handling trains, and no other business is transacted over it, except as he may direct. The dispatcher is cut in on the circuit at all times, but stations are not. It is not necessary for way stations to ring the dispatcher; all a way station operator needs to do is to take down the receiver and pronounce the name of his station. If the line is busy when he takes receiver off, he simply waits until it is clear. Stations desiring to communicate with each other must request the dispatcher to call the other offices for them, as they cannot do so themselves. This is so arranged in order to give the dispatcher entire control of the use of the line. A secondary circuit has been established for emergency use, by transposing two iron telegraph wires. They, as well as the copper pair, are cut into switchboards at every third or fourth office and equipped with hand-throw switches. If any trouble comes in on the copper pair, for instance between Barrington and Crystal Lake, the dispatcher locating it between these offices directs those two offices to cut in the emergency iron pair at each place. One movement of the switch does this, and the line is again ready for use. When trouble has been cleared the lines are restored to normal. The transposed pair of iron wires are, of course, used for telegraph work when not patched into the copper pair. Even then they can be used on either side of the patch. One movement of the switch cuts out both telegraph and telephone at any station, and this is done when the office is left unattended for any length of time, or when closed for the night.

In the Receiving Room Taking the Telephoned Orders of the Dispatcher.

In handling train orders by telephone it should be remem-

bered that all rules and regulations governing train movement remain the same as under the telegraph. No rules or practices have been changed and everything that has been done is still done, the only difference being that they talk instead of work a telegraph key. The orders as delivered to conductors and engineers are just the same in form, appearance and every particular as they have been and are handled exactly the same as heretofore. In issuing a train order, the dispatcher, after calling the stations he wants, proceeds with his order in the same form and formula as if by telegraph. The names of all stations, conductors, train and engine numbers and time are first pronounced plainly, then spelled out letter by letter and figures duplicated, naming each figure separately. When speaking the order the dispatcher is writing it in his record book, which is quite a materal safeguard over the telegraph practice. When he is done speaking he is done writing and ready for the repeating by the operators. This reduces his speed of conversation to his own ability to write it down, and also gages the speed for the receiving operator out on the line and does not hurry him unnecessarily. The operators repeat the orders back to the dispatcher in the same way, giving "X" acknowledgment, etc., the same as ever. All operators concerned listen to repeating, thereby checking each other. The dispatcher underscores each word and figure in his record book as it is being repeated by each operator. Following are two illustrations of orders; the hyphenated words and figures being spelled out letter by letter. The orders as delivered do not show these spacings or brackets, which are merely used for this illustration:



Train Dispatcher's Signaling Box Opened Showing Mechanism.

Example I.

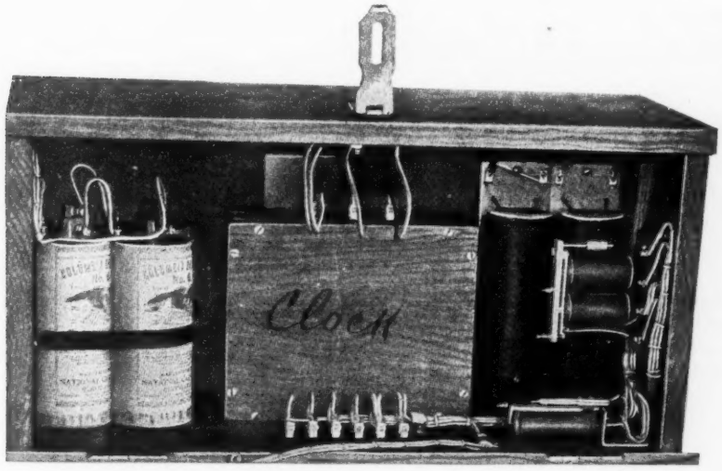
Order No. 49.

To C. & E. No. F-i-f-t-y F-i-v-e (Five Five):

Extra E-l-e-v-e-n S-i-x-t-y S-i-x (Double One Double Six) and No. F-i-f-t-y F-i-v-e (Five Five) Engine S-e-v-e-n (Seven) J-o-n-e-s will meet at Bombay (B-o-m-b-a-y) instead of Bangor (B-a-n-g-o-r).

Example II.

No. T-w-e-n-t-y T-w-o (Double Two) Engine S-e-v-e-n-t-y S-e-v-e-n (Double Seven) S-m-i-t-h will meet No. T-h-i-r-t-y F-i-v-e (Three Five) J-o-n-e-s at Bangor (B-a-n-g-o-r).



Way Station Signaling Box Showing Inside Mechanism.

In reporting trains to dispatcher, (3s) no calling is necessary —operators merely take the receiver off the hook, speak the name of the station, and go ahead with their business; the dispatcher being cut in continuously, hears them, gives his acknowledgement, etc., and the transaction is completed. Due to the fact that the dispatcher writes his order in his record book as he speaks it, he is all ready for the repeat when he is through speaking. The operators can then talk it back to him as fast as they can speak distinctly and plainly. The result is that, counting the time saved in calling and the quicker repetitions, we find that orders and 3s are handled about 50 per cent quicker than by telegraph. This means that the dispatcher can dispose of his work that much faster, has more time to figure out movements, meeting points, etc., and can handle a great many more trains on his trick and handle them more promptly, thereby greatly facilitating train movements. It further places the dispatcher in closer touch with all the little details of his daily work and in closer touch with his men out on the line.

It has been our observation that there has been a decided improvement in the work and deportment of the men out on the line, due to the fact that the conversations between the dispatchers and operators or other employes are of much more personal character than obtained by telegraph, resulting in closer working relations and more pleasant co-operation. It is more as if they were facing each other and they don't feel like indulging in some of the choice remarks that used to fly over the telegraph wire when some one would lose his temper. A man doesn't feel as brave and cocky when he is talking directly to you. We have had instances where derailments or other accidents have occurred, and the dispatcher being able to converse directly with the conductor on the ground and the conductor being able to explain things in his own way, more has been accomplished in ten minutes than could be done by telegraph in an hour under the same conditions.

Each superintendent has a telephone on his desk connected with the dispatching line. He can listen in, or talk with any or all his stations at any time. He can check up any slackness himself and keep in close personal touch with everything, which was not possible telegraphically, unless the superintendent was a telegrapher, and this was not always the case.

It has opened up an avenue for employment for injured trainmen and other employes, who make first-class block operators or station agents, being experienced and much more desirable and reliable than some strange operator who might come along, or some young fellow starting in. It should likewise open up a future avenue for bright young conductors to become train dispatchers should they so desire. There are many young conductors who ought to make first-class train

dispatchers, and under telephone operation it would be a comparatively easy matter for them to do so, as they usually have the necessary experience and all the requirements, except the ability to telegraph. The train dispatchers are all enthusiastic over it and appreciate it, as it lightens their many burdens to a considerable extent, and we all know they have burdens enough to carry.

Another important feature in the use of the telephone for train dispatching is the fact it works as well, if not better, in bad or foggy weather than in good—just the reverse of the telegraph. No instruments out of adjustment and no operator breaking into the middle of an order with a string of dots like a gatling gun, trying to adjust himself and not knowing how. The telephone remains in adjustment in any kind of weather; the signalling apparatus may be affected, but the telephone will not be.

There are many other advantages connected with the use of the telephone for train dispatching, which we will not enumerate on account of lack of space. The advantages are very apparent, however, and it is decidedly a step in advance in the method of handling trains. More trains can be handled in a given time, prompter movements can be made, emergencies handled and controlled quicker and better, everybody is placed in closer touch with each other, and it is just as safe, if not safer, than the telegraph for such purposes. When telegraph orders were first introduced, the first train and engine men handling them were afraid of them and did not want to use them. Now we would not do without them. It was a great advance over running by smoke and time card. Some day the telephone will be regarded as being just as much of an advancement over the telegraph for train movement purposes as the telegraph was over the preceding methods. The change from telegraph to telephone operation on the two divisions mentioned was made without a hitch. All the officers and men concerned are entitled to a great deal of credit for the willing and efficient manner in which they took hold of the matter.

We wish to take this occasion to correct and wipe out an erroneous impression that the telephone may soon supersede and replace the telegraph entirely. This will not happen in your time or mine, unless the future brings forth innovations, improvements or conditions that cannot now be foreseen. As an instance of this, on the two districts equipped, while we are using the telephone for train movement business, we have retained the telegraph for ordinary messages, commercial business, etc. Railroads when needing additional communication facilities will expand, both ways, rather than one way. They will undoubtedly have both for many years to come, and the writer now wonders why they didn't have both long ago.

A Striking Quotation.

Mr. G. R. Johnston, editor of the *Bulletin* of the Ohio Independent Telephone Association, reproduces on the cover of the August issue the following, by Thomas Babington Macaulay:

"And I believe, sir, that we may safely take it for granted that the effect of monopoly generally is to make articles scarce, to make them dear, and to make them bad."

Strong, and clear, and from a pretty good authority, is it not?

U. S. Copper Production in 1907.

According to the advance statement of the production of copper in the United States in 1907, prepared by L. C. Graton and issued by the U. S. Geological Survey, the production in 1907 of refined new copper of domestic origin was 784,271,427 pounds, a decrease of 103,410,960 pounds, or 13.2 per cent, from the production of 1906. The total output of refined copper (exclusive of domestic scrap, etc.) by domestic refineries in 1907 was 1,032,516,247 pounds. The details of production for 1906 and 1907 are shown in the following table, which is based on actual returns from all refineries:

	1906.		1907.	
	Domestic origin.	Foreign origin.	Domestic origin.	Foreign origin.
Electrolytic	748,614,592	191,370,022	592,326,608	245,062,814
Lake	205,608,382		178,534,141	
Casting	33,459,413		13,410,678	3,182,006
Total	887,682,387	191,370,022	784,271,427	248,244,820
Total output domestic refineries	1,079,052,409		1,032,516,247	

Production of Refined Copper in 1906 and 1907 (In Pounds).

The 1907 figures for domestic electrolytic include 34,917,988 pounds Lake copper which were refined electrolytically; those for 1906 contain 24,017,833 pounds Lake copper. The figures for domestic casting exclude Lake copper and copper recovered from secondary materials.

In addition to the above production of refined copper, 25,129,617 pounds (of which 8,316,861 pounds were electrolytic and the balance casting) were recovered during the year by the regular copper-refining companies of the country from domestic scrap, drosses, etc., and returns from practically all the known refiners of secondary materials indicate that 35,355,966 pounds additional were turned out by them as casting copper and in alloys. The copper produced from secondary sources in 1907 was therefore somewhat over 60,000,000 pounds, or more than 7.5 per cent of the year's production of new copper.

STOCKS.

Returns from all the Lake and electrolytic refineries, practically complete, show that the following stocks of refined copper were on hand at the beginning and end of the year:

	Pounds.
January 1, 1908	125,745,796
January 1, 1907	46,497,181
Stocks increased during 1907	79,248,615

Undelivered sales are almost entirely excluded from these figures. Stocks carried by consumers and brokers have not been estimated. In addition to these stocks of refined copper there were at smelters, in transit to the refineries, and at the refineries blister copper and material in process of refining to the amount of 135,310,239 pounds on Jan. 1, 1907, and of 175,254,659 pounds on Jan. 1, 1908.

CONSUMPTION.

The apparent consumption of refined new copper in the United States in 1907 was about 485,000,000 pounds, as compared with about 685,000,000 pounds in 1906. One method of deriving these figures is based on the total refinery output. The data are as follows:

	1906.		1907.	
Total refinery output	1,079,052,409		1,032,516,247	
Refined copper imported	28,191,053			
Stock at beginning of year	72,270,417		46,497,181	
Total available supply		1,179,513,879		1,079,013,428
Refined copper exported	446,750,711		465,496,007	
Stock at end of year	46,497,181		125,745,796	
Total withdrawn from supply		493,247,892		591,241,803
Apparent consumption		686,265,987		487,771,625

Consumption of Refined Copper in 1906 and 1907 (in Pounds).

It is probable that, in addition to the consumption shown above, most or all of the 60,000,000 pounds or more of reworked copper was consumed.

RECENT TELEPHONE LITERATURE

Conducted by H. P. Clausen.

The New Central Battery Exchange at Tottenham, London. J. W. O. Sandell. 141—7-1-08. The switchboard which is described is of an immediate capacity required for 800 subscribers' lines. Views of the operating room and other portions of the exchange are presented and also a floor plan showing the general distribution of the apparatus. The circuit diagrams show the subscribers' line circuit which is of the cut-off jack common battery type, utilizing target signals, and the cord circuits, likewise of the target type. It is interesting to know that the batteries supplying current for transmission purposes consist of sixteen cells and the cord circuits are of the impedance coil transmission type, which form has been almost exclusively adopted by the Independent companies throughout the United States.

Elements of Electrical Engineering. A. E. Watson, 127—5-30-08. In a lengthy series of articles upon electrical engineering, the present installment refers to general operation and connection of the mercury arc rectifier. This description should be of interest to the telephone reader, as also some descriptions and connecting diagrams illustrating alternating current machinery and apparatus. It is said that the rectifier operates at an efficiency of about seventy-five per cent, and further that in warm places it may often be necessary to run a cooling fan so as to provide for the effective condensation of the mercury vapor on the inside walls of the glass bulbs.

Measurement of Telephone Currents. Béla Gàti. 161—1-08. This is a brief discussion of the difference in the effects observed in transmitting telephone speech through cables and other circuits. Curves are shown indicating the transmitted and received currents and the barretter as applied in measuring telephone currents is also briefly discussed, circuit diagrams being shown.

Construction of Toll Lines. 134—6-1-08. Construction articles are generally of interest and in the present instance particularly so on account of its being written in a popular and easily understood manner. General discussions of cross arms and the placing of them upon pole tops is also touched upon, as well as the method of bracing poles and placing them around curves.

New Electrical Apparatus of the United States Signal Corps. C. H. Claudy. 128—6-2-08. In a profusely illustrated article the United States Signal Corps system of telephones, telautograph and wireless telegraphy are described. The telautograph, it will be recalled, is used for electrically transmitting written messages between different points. The telephone is shown to be applied in many useful directions.

A Study of Multi-Office Automatic Switchboard Telephone System. W. L. Campbell. 127—6-1-08. This paper treats of three principal topics. The great economic waste which the use of wire, cable and conduit equipment in a telephone system involves; a general discussion of the reasons which make this waste necessary in manually operated systems; a general discussion of how the waste can be reduced in the system described by Mr. Campbell. The article is of considerable length, thoroughly illustrated.

*Numbers refer to publications in which article was printed, as follows:
127—Trans. Am. Inst. Eng., New York.
128—Scientific American, New York.
134—Telephone Age, Toronto, Canada.
141—National Telephone Journal, London, England.
161—Schwachstromtechnik, Munchen, Germany.

The Business Concern and the Banker.

A banker may say that he believes a concern safe though it is negligent regarding the amount of reserve it maintains; but how different will be his tone when he knows that year after year as the business has grown, the surplus has been increased in proportion. There are so many ways in which a bank may and will help the industry in which it has confidence. There are times when the state of trade is such that it demands of the business an important outlay to provide for natural increase. New buildings or new equipment, or both, are actually necessary to meet conditions and to provide against competitors securing all the new business and finally a monopoly. You might perform this work by hypothecating the reserve and finessing gross receipts; but you will go down on the bankers' doubtful list. A better plan would be to have your banker negotiate a bond issue and thereby keep your surplus even.—*American Industries for September.*

A New Line of Telephone Statistics.

According to the New York *Herald* "it is estimated that the telephone has added nine per cent to the daily lies told in New York City. The usual lie added to the list is 'busy'."

LETTERS ON PRACTICAL SUBJECTS

Common Battery Private Line.

Contracts for private line service, to be given over the cable conductors of a telephone company, are frequently made by business houses having offices in two distinct sections of a town. An example of such use is that made by a coal company, receiving all orders at its down-town offices, and requiring a line which will always be free for transmitting many messages a day to the office at the storage bins.

For such lines as this, in a common battery exchange, it is desirable to supply battery to the instruments direct from the central office, and provide the features of automatic calling on lifting the receiver from the hook. A circuit in operation in the new exchange of the Independent Telephone Company, at Omaha, Neb., fulfills these conditions satisfactorily and may be economically installed and maintained.

At the central office a differential relay is connected across the cable conductors which are cross-wired together to form a continuous line, as shown in the illustration. Then station No. 1, for instance, calling No. 2 or No. 3, removes his receiver from the hook, and, if the line is not in use, presses the ringing button two or three times, according to the ringing code. The grounding of the battery side of the line

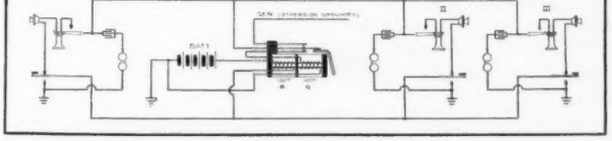


Diagram Showing Use of Differential Relay in a Private Line Circuit.

at any station causes the relay to pull up its armature, and throw ringing current on the ground side, ringing all the bells. Station No. 2 or 3 can call and talk with either of the other stations in the same manner.

This is the only circuit known to the writer that will allow more than two stations on a common-battery line.

A close inspection of the diagram will show how the differential relay operates. When the ringing button at any station is pushed, current flows through one of the coils and not the other, pulling up the armature and closing the ringing contact. But when the button is not pushed and the receiver off the hook, current flows through both coils, the currents in the divided path neutralizing each other, and leaving the circuit in talking condition. The impedance of the relay windings, of course, prevents disturbances from being propagated through the battery to other lines.

OMAHA, NEB. J. SHIELDS ROBINSON.

Concerning A Bell Pamphlet

From many sources information comes to the operating Bell officials which convinces them beyond a shadow of doubt that the financing of the independent telephone companies is generally unsound and sure to bring loss to innocent investors. * * * * Anyone who attacks the financial integrity of a competitor is sure to be credited with unworthy motives. * * * * It seems that the misrepresentations and direct misstatements of the independent telephone promoters should be met frankly and boldly.—Abstract from "*A Table Showing the Financial Condition of Some of the Independent Telephone Companies*," issued by the "Information Department" of the American Telephone & Telegraph Company.

Bold enough would be the statements set forth within the pages of the pamphlet bearing on its cover the legend from which the above abstract is quoted, if made in definite form. It contains figures purporting to show the capitalization of Independent telephone companies, accompanied by amounts of "estimated" fixed annual charges per station which are intended to convey, to the casually reading investor, the impression that earnings are insufficient to cover and guarantee a steady income. As to frankness, which is commonly taken to mean an open, liberal setting forth of the truth in undisguised form, if the reports of officers in charge of many of the companies named in this table count for anything, this is a quality absolutely wanting in the pamphlet.

Data showing the financial results of the operations of many of the companies criticised have already been published in the columns of TELEPHONY. More are in its possession ,and will be published from week to week in the space devoted to such reports. These reports, furnished and vouched for by the responsible officers of the companies with whose affairs they deal, will speak for themselves as to the security and income afforded on investments in the securities of these companies. The public, on examining these reports,—and they are published in the columns of Telephony for the express purpose of giving Independent managers throughout the country an opportunity to put them before an interested public—can determine for themselves whether the companies are sound.

And a comparison of these official statements of the Independent companies with the bulletin issued by their competitors will show the great inaccuracy of its misstatements. Taking a convenient example, the A. T. & T. "table" has a statement to the effect that the Fayette Home Telephone Company, of Lexington, Ky., has outstanding securities amounting to $610,000, and that its capital investment per station is $238. Comparison with figures included in a long article which President George S. Shanklin immediately furnished to the three leading newspapers of Lexington, and which was published in these papers, shows the careless inaccuracy of the A. T. & T. statement, in that the securities actually issued are $634,000. On this basis, and that of the *correct* number of subscribers' stations, 3,330, as stated by President Shanklin, the capitalization per station reaches approximately, $190; this is $48 less than the figures set forth by the A. T. & T. Company, an error of 20 per cent. Is it to be wondered at that a company which attacks the financial integrity of its competitors in this fashion is credited, not only with unworthy motives, but with improper methods?

So much, at present, for capitalization and earnings. Now, to the matter appearing under the heading "Independent Telephone Company Failures." This consists of eight loosely printed pages of matter, numbering, it is said, 114 items relating to about 100 different companies. The source of the statements is not indicated; the A. T. & T. Company thus may fairly be assumed to stand back of them as authority for their truth.

Perhaps these statements presented, as it were, in bulk of words, might convey to the most unthinking reader an unwarranted impression of an absence of strength in the Independent telephone business. But the lack of real substance in the list makes it one of the most impressive testimonials to the soundness of the Independent telephone business which was ever printed. The International Independent Telephone Association was quick to recognize this, and has sent out to the officers of the country's banks, thousands of postal cards, such as are here reproduced. Independent managers are recognizing the force of this argument, taking advantage of the offer of the Association to supply these cards to Independent companies in any reasonable quantity desired at actual cost, and mailing them to all persons who have money to invest. Thus is the A. T. & T. pamphlet promoting inquiries into the Independent telephone business which helps the sale of the securities of its competitors. As to the *facts* about failures, following is a partially completed list of reliable information which may be given in answer to inquiries on this point.

MONTANA.

Quotations from A. T. & T. pamphlet:—"March, 1903, Custer County Telephone Company, Miles City, Mont., was sold at sheriff's sale for $1,500; its original cost was $10,000."

"July, 1903, Forsyth-Lame Deer Telephone Company, Forsyth, Mont., placed in receiver's hands."

Abstract from report on the above companies, from the cashier of a Montana bank:—"September 23, 1908—The telephone lines running from Miles City to Ekalaka, known as the Custer County Telephone Company, and the line running from Forsyth to Lame Deer and Ashland, cannot be considered failures as they are still running. They have not been profitable, for the reason that they were built hurriedly in a very cheap way, with pine or cottonwood poles on a cheap construction all through, and were owned by business men who could not take time to give any attention to them. As the lines get down, there was no one to replace them and the lines got in pretty bad repute. However, they did eventually make repairs, and I think the lines are in better shape now than they have been since they were built. The lines are in daily use, and I am told that the Miles City-Ekalaka line is paying a dividend."

Comment on above report from the president of another Montana bank:—"My understanding is that these lines were simply built up for neighborhood convenience. The Lame Deer Agency used to be quite an important Indian Agency, and had several hundred soldiers, but during the last few years these have been withdrawn. And, although the business between Forsyth and Lame Deer was of considerable importance at that time, in later years it has declined and the revenue necessary to keep up the line has fallen off to such an extent that I presume it did not pay to keep it up, and the stockholders thought it best to wind up the business.

"The Ekalaka line has declined for similar reasons; on account of the Milwaukee road building through that territory it has lessened the importance of communication between this town and Miles City."

NORTH CAROLINA.

Abstract from A. T. & T. Bulletin:—"July, 1903, Columbia Telephone Company, Whiteville, N. C., sold under foreclosure

to an association of preferred creditors for $3,900. Line cost $18,000."

The secretary of a long established and important business house at Whiteville, N. C., was informed of the nature of the above statement, and asked on Sept. 21, 1908, to reply to the following inquiries:

Was there a telephone exchange in your city operated under the name of the Columbia Telephone Company?

Was it sold under foreclosure as stated?

Was it an Independent telephone company?

In reply to each of these questions, he gives the answer, "None."

NEBRASKA.

Abstract from A. T. & T. pamphlet:—"April, 1904—Line of the Interstate Telephone Company, between Virginia and Beatrice, Nebr., sold at sheriff's sale for $405."

Local report:—The Interstate Telephone Company has its headquarters at St. Joe, Mo., and is understood never to have suffered any financial embarrassment. It has been doing a general long distance toll business in the southeast part of Nebraska and in parts of Kansas and Missouri for eight or ten years. This company formerly owned a line between Virginia and Beatrice, about eleven miles long, which was unprofitable. A farmer living on this line bought stock in the company, and one of the conditions of the purchase was that he should be furnished telephone service. As the line was not profitable, the service was never furnished to the stockholder. On account of this, he brought suit against the company to collect damages, and secured a judgment. The line was sold at sheriff's sale, and the proceeds were used to satisfy the judgment secured by the stockholder.

The above is the only "horrible example" reported from Nebraska.

IOWA.

Abstract from A. T. & T. pamphlet:—"May, 1904—Property of Sumner Telephone Company, Sumner, Ia., consisting of nearly 200 miles of toll line, and eight exchanges, to be sold at public auction to settle a judgment of $5,000. Stockholders have invested $45,000, and also several years' earnings."

"June, 1904—Plant and equipment of the Ottumwa Telephone Company offered for sale, and will be sold because of inability to secure more capital."

Report from local sources:—"The Sumner Company did not fail. Its property was sold four or five years ago, by consent of stockholders, to E. A. Hurmence. The company only owed $3,000 at that time, and this indebtedness has long since been fully paid. This company was organized and managed for a time by a man who had a disagreement with the stockholders, which culminated in the sale of the property after the manager had been turned out. This property now is entirely owned by Mr. E. A. Hurmence, who is in active charge of the property, and one of the best known men among Iowa's progressive Independent telephone managers, although he does not devote all his time to the telephone business, being a prosperous farmer.

This telephone company now has 2,500 subscribers as compared with 400 in the same territory connected to the lines of its competitor, the Iowa Telephone Company. Mr. Hurmence is understood to be making a profit on his system, and is adding new subscribers and toll circuits constantly. His competitor is not paying dividends.

The Ottumwa Telephone Company did sell out because it could not raise money. The reason for this was that some of its stockholders failed. These stockholders had borrowed money from various parties, and pledged with them the preferred stock of the Ottumwa Telephone Company as collateral security. The stockholders failed to pay their obligations to the holders of the collateral, which was accordingly left on the hands of the persons making the loans. A meeting of these creditors of the stockholders was held to consider the best method of realizing on their stock acquired through the default of the stockholders of the Ottumwa Telephone Company. The creditors, who had in this manner come into possession of an interest in the Ottumwa Telephone Company, decided to pay off the bonded and floating indebtedness of the Ottumwa Telephone Company, and organized a new company. This they called the Ottumwa Telephone & Electric Company. The Ottumwa Telephone Company, which thus passed out of existence, always paid its debts and met all obligations promptly, and was not re-organized on account of the failure of the company. Its successor, the Ottumwa Telephone & Electric Company, has likewise paid its debts and met its obligations promptly since its organization. It has about 3,000 subscribers now, and is adding to its subscription list at the rate of thirty to fifty telephones per month, net, above all disconnects. It has a good plant, and direct toll circuits to Burlington and Des Moines, giving the best grade of long distance service. The financial results of its operation show a surplus representing a good net profit, after making adequate maintenance charges each year.

Many more reports are ready for publication, their combined substance indicating that the alleged failures reported represent insignificant totals, as measured either in money losses to investors, or in territory lost to the Independent telephone movement. Lack of space, however, prevents publication of further detailed reports in this issue.

A characteristic item of value, bearing on the general situation, is furnished in the summary of replies to questions put to one hundred representative banks of the state of Missouri. The Theodore Gary Investment Company, of Macon, recently mailed one hundred letters to banks of Missouri asking these questions:

"Will you kindly advise me under cover of the enclosed stamped envelope if you know or have heard of any Independent Telephone Company in Missouri, which, at any time, has defaulted in the payment of either the interest or principal of its bonds."

Ninety-one banks replied. Ninety said they did not know of any failure or default. One said that he knew of a small Mutual that passed one interest payment, but had finally gotten on its feet, and that the payment was passed for the purpose of reorganization.

Independent Branch Exchange in Court House at Wichita, Kansas.

At Wichita, Kansas, the county commissioners have arranged for the installation of a private branch exchange switchboard, with telephones in nearly all the offices in the county court building.

The switchboard is being installed by the Independent Telephone company.

THE AMERICAN TELEPHONE & TELEGRAPH COMPANY
(BELL)

gives a **remarkable endorsement** to the **success and prosperity** of the

INDEPENDENT TELEPHONE COMPANIES

by publishing the names of such as have failed, re-organized, **or passed any dividends** during the **last five and one-half years.**

THE LIST SHOWED 114 SUCH COMPANIES.

A book published, June 1908, contains the names and capitalization of **12,045 NON-BELL OR INDEPENDENT TELEPHONE COMPANIES.**

What other representative business can show but 1% of failures, or **temporary suspension of dividends** during a period of five years?

INTERNATIONAL INDEPENDENT TELEPHONE ASS'N.

September 24, 1908 **Chicago, Illinois**

Reproduction of Postal Card Mailed to Bank Officials.

Police Telephone Booths on Long Island.

In the suburban villages on Long Island, N. Y., where the police have to cover a large territory, it is often impossible for them to be on hand when most needed. In order to guard the homes in the various villages, police telephone booths have been established.

A booth such as is here referred to is a small shed, or box, placed at some accessible point in the territory, in which there is stationed a bicycle policeman all of the time, except when answering calls. Three are stationed there throughout the day, one at a time. There are no shifts of eight hours each and each stays in the booth until relieved by his fellow. To the booth is connected a separate telephone and a telephone direct from the police station. The officer keeps a blotter and writes down all calls, just as is done in the police station, reporting ever so often to the station to which he is attached. His value is easily seen.

If there is a robbery or any disturbance in any portion of the territory in the center of which the booth stands, any resident may immediately telephone directly to the officer at the booth or to the station, and be connected with him, and the officer can immediately after notifying the precinct lieutenant, jump on his bicycle and in a short time be where he is needed. Assistance can thus be secured to the suburban districts far more quickly than if a man was sent from the police station, or a vain effort was made to communicate with some mounted policeman riding a mile or so away.

Seeing the value of these depots, the police department began their establishment about a year ago, the first one being built in Dyker Heights, has done efficient work. Three months ago, in response to the request of Queens residents, a station was established on Metropolitan Ave. and Dry Harbor Rd, Glendale, and has likewise shown its necessity and value. In a short time it is expected that Bay City, another unprotected territory, will have a booth, and others, if Inspector Sweeney's desire is carried out, will be constructed in various other places.

Prospects of Independent Activity in Tennessee.

While the Home Telephone Company has not yet announced its purposes it is understood that this company will soon show renewed activity in the fight for its rights in Nashville, Tenn. The Home company has been working for a franchise in Nashville for several years, but it appears that the Cumberland Telephone & Telegraph Company (Bell), which has its home offices in that city, has been able to control the situation sufficiently to accomplish its desire of blocking the progress from time to time toward the erection of a competing plant.

Last winter it began to look as if the Home management had the way paved for an entrance into Nashville, but a controversy over the use of the conduit system seems to have checked the plans. The conduit system in Nashville is largely owned by the Cumberland company and the local light company.

The Home interests succeeded in getting the city council to rescind its action in accepting $10,000 per year as a franchise tax from the Cumberland "as long as the city council did not grant another company a franchise in the streets." When Mayor Brown was elected and took the oath of office one of his first acts was aimed at the Cumberland company. He was in favor of a bill, which passed the council, allowing the Home company to use the streets in accordance with the provisions of a state law passed in 1907, but when the matter of charges for the use of the underground system came up the Cumberland company insisted on a rate that was practically prohibitive. While the Cumberland is the dominant power in the control of the conduit system the city reserved the right to place its wires therein, and also provided for space for any other wire using companies. The rates could not be agreed upon, however, and there the matter stands.

The Cumberland company has, in the meantime, continued publishing literature against "two 'phones," and endeavoring in every way to arouse opposition to the Home company. The Tennessee legislature meets early in January, and it is understood that several bills will be introduced, the effect of which will be to make it impossible for local authorities to resist a well established public demand for competition in telephone service.

Telephone Line over Alpine Glacier.

Italy will shortly possess the highest telephone station in the world. Work has been commenced on the new telephone line to the Margherita hut, near the summit of Monte Rosa, 15,217 ft. The new observatory on the Col d'Ollen will be first connected with the Lombardy Valley, and then the line will be continued to the summit of Monte Rosa. Queen Margherita of Italy, who contributed largely to the erection of the observatory and hut which bear her name, has been the chief supporter of the Alpine telephone line. Swiss critics, however, state that the innovation will be a failure, as it is impossible to plant posts in glaciers and masses of ice which are ever in a state of slow motion.

Forest Fires Causing Damage to Telephone Lines in Wisconsin.

Forest fires are raising havoc with property of the Wisconsin Telephone Company in the northern part of the state, and with a number of crews and individual guards it is a nip and tuck race to maintain uninterrupted service. "Between Ashland and Ironwood we have been bothered on toll lines," said President Burt, "and forest fires are causing some loss in the destruction of poles and in subsequent repairs. Poles are burned off or totally destroyed, and if the wires are not let down to earth and grounded, they are broken. They are also parted by the falling of burning trees on either side. In running a line through the woods a path is cut over the right of way and overhanging branches and dangerous trees removed for some distance back. This, however, does not insure absolute safety in case of a bad fire, as is being demonstrated. Repair men are kept on the jump in maintaining service, and we have had no interruption of business. A crew is installing a new line between Rhinelander and Minoqua. Poles have been erected and the stringing of wire should be well along, but if fires continue to advance a large part of the work will be undone because of the destruction of poles."

Seattle Independent Company Not to Merge With Competitor.

Associated Press reports have appeared in various parts of the country, and notably in the Pacific Coast states, to the effect that the Independent Telephone Company of Seattle, Wash., is to enter an agreement to combine with its competitor.

Although these reports indicate, on careful reading, that they originated in an irresponsible source, they are believed to have been used in an attempt to influence other Independent companies to enter into illegal combinations with their competitor. The Independent Telephone Company, in a telegram to TELEPHONY, dated Sept. 29, says that there is no truth in the newspaper reports.

Telephone Subscribers Asked to Pay for Service Which Cannot Be Given.

According to cable dispatches from Paris, France, several thousand telephone subscribers, who are among those for whom no communication can be established for some weeks to come on account of the recent destructive fire, were surprised to receive quarterly bills for $20 in advance, just as usual. On protesting they were told that the bill depart-

ment and the mechanical department were "entirely separate" and that they must pay according to the law or expose themselves to the penalties named in the contracts. The latter say nothing about fire, so several hundred subscribers have decided to make a test case of it.

They will put the matter in the hands of the Telephone Subscribers' League, which was formed some years ago to improve the service, but never got an opportunity to do anything until now.

The public is vastly amused at this attempt to collect bills after the naive admission that it is certain that thousands of the subscribers cannot use the telephones for months.

Practical Questions and Answers

Shunt for Voltmeter—Resistance Table.

I have a standard Weston voltmeter of 10,000 ohms resistance which I want to use for measuring crosses on long distance lines. It has a 30-volt scale. What shunt would be necessary to enable me to measure for trouble on lines 80 to 100 miles away and catch the location within 100 feet or so? I would like also to have a table of resistances to go by when using the shunt. Is a voltmeter of this type good to test trouble that far away? If not, would you kindly give me your ideas on an instrument to test telephone troubles of any kind, both toll and local?

To locate electrically a fault in a 100 mile line so that the error shall not be more than 100 ft. means a total error of about 0.02 of one per cent. This is less than is possible to obtain in commercial work. To locate a short circuit within a mile on that length of line would be sufficiently accurate and about all that can be expected.

Make the shunt such that the joint resistance of voltmeter and shunt will be 1000 ohms, which will give you as good accuracy for all around work as can be desired. The shunt itself will be 1111 ohms. If R is the joint resistance of voltmeter and shunt, E the battery voltage, e the reading while testing, then X, the unknown resistance, will be

$$X = R\left(\frac{E}{e} - 1\right), \text{ or } X = R\left(\frac{E-e}{e}\right).$$

The numerator, $E-e$, is most accurate when e is small, owing to the voltmeter's having a low resistance. But the denominator is most accurate when e is large. Also, the readings of the pointer are more accurate when high values are obtained, since the friction of the bearings is less in proportion to the forces acting. These latter two considerations call for high resistance in the instrument. The safest course is between, so that the resistance of the voltmeter should be about equal to the resistance to be measured. One thousand ohms means about 95 miles of No. 10 copper, the larger sizes being for correspondingly shorter distances. The following table gives the resistance corresponding to readings, e, it being assumed that the battery voltage is 30 volts. Since readings less than five volts are not very accurate they are omitted.

Voltage e	Unknown Resistance.	Voltage e	Unknown Resistance.	Voltage e	Unknown Resistance.
5	5000.	14	1143.	23	304.3
7	3286.	15	1000.	24	250.0
6	4000.	16	875.	25	200.0
8	2750.	17	764.7	26	154.0
9	2333.	18	666.7	27	111.0
10	2000.	19	578.9	28	71.4
11	1727.	20	500.0	29	34.5
12	1500.	21	428.6	30	0.0
13	1308.	22	363.6		

The above table is correct only when the battery voltage is exactly 30 volts. If greater or less than 30 volts, a correction must be applied as follows: Let "v" be the difference between the real voltage and 30. Let "y" be the correction which must be added to the tabular value of the resistance. Then.

$$y = \frac{Rv}{e}$$

The correction, y, is to be added to R if the battery voltage is greater than 30, and subtracted if it is less. Suppose we have a battery voltage of 29.5, and on a certain test the reading, e, is 25 volts. The apparent resistance from the table is 200 ohms. Applying the correction,

$$y = \frac{1000 \times .5}{25} = \frac{500}{25} = 20$$

and the correct resistance is 200 — 20 = 180 ohms.

Though the voltmeter is a handy instrument in many ways, yet the Wheatstone bridge is more accurate for all around testing. The voltmeter is better where you have swinging troubles, as it will indicate their nature and often enable you to catch their value, which the bridge will not do. You should have both in your equipment, but if you must get along with but one the voltmeter will probably serve you better.

Trouble in Using Battery While Charging.

While charging a storage battery recently I had an accident which I can not explain. Each cell is fused separately to terminals on an experimental switchboard, so that each cell or group of cells is entirely insulated from all the rest. To charge, we loop them all in series, and place them across 110 volts, using a rheostat to regulate the current. There are 30 cells in all, and we charge at five amperes. I was using current from a group of ten cells, while charging the entire battery, to operate a 100-ohm relay. By accident I short-circuited my leads, making a bad flash. After that the relay began to get hot, and when finally I disconnected there was another flash. On examining the fuses I found both fuses to the ten-cell group blown. Why did this happen when I had only the ten cells in use?

From your description of the case, the arrangement of wires and battery was as shown in Fig. 1. The fuses which melted are indicated. You will readily see that their rupture leaves the 100 ohm relay directly in series with the battery, rheostat, and 110 volts. The resulting current was enough to make any relay hot unless wound with large wire. An easy calculation will show the conditions. If the battery was being charged its voltage might be anything

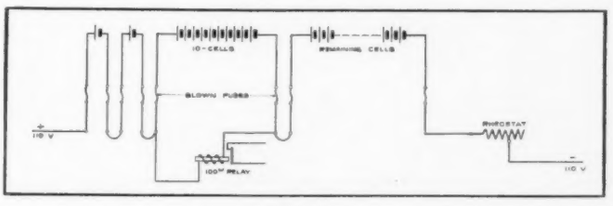


Fig. 1.

from 1.90 to 2.50 volts per cell. Assuming 2.20 volts per cell the total battery voltage was 66 volts. Subtracting this from 110 volts leaves 44 volts to be taken up by the rheostat. Since the current was five amperes the rheostat was set at 8.8 ohms.

Now, when the fuses blew, they removed ten cells from the circuit. This left 20 cells with 44 volts to oppose the 110, leaving a net voltage of 66. This 66 volts forced current through the 100 ohm relay and the 8.8 ohm rheostat, so that the resulting current was .61 ampere. Under normal conditions a 100 ohm relay will not get over one or two-tenths of an ampere, so it is no wonder that the .61 ampere made it hot.

The Telephone in the Courts

Conducted by A. H. McMillan

Rental for Attachments on Poles.

I, being a subscriber to your journal, take the privilege of asking you if you can inform me what is regular rental for attachments on poles. Will say, for instance, if the Bell Telephone Company asked permission to run wires on some other company's poles, what is the regular rental for fastening; or if an opposition company, such as the Bell, placed wires on your poles without permission and refused to pay and you would have to go to court to collect, what would be lawful to charge?

There is no regular rental for attachments on poles. It would be lawful to charge a company which placed wires on your poles without permission, any sum that would be considered reasonable under the circumstances of the case, particularly taking into consideration the value of the privilege to the company that uses your poles. What such a sum would be could only be determined by the court in each particular case after listening to all the testimony, probably including expert testimony of those competent to testify on the subject. We could not express an opinion without knowing more about your exchange and situation than you could tell us in the course of a letter.

Leasing Telephone Exchanges.

Can you please inform me how I may obtain information giving different plans and terms of leasing telephone exchanges? I am desirous of leasing an exchange and therefore wish to become posted on different methods.

We cannot give you much information on the subject of leasing telephone exchanges without knowing the entire situation of both your company and the one you desire to lease. Such information as would be necessary would cover the entire condition and circumstances of the prospective arrangement. We suggest that you call upon the manager of some large telephone company near you and exchange ideas. If you can find a company which has a leased line, or is operating under a lease, you can more easily get the information.

Free Use of Telephones by Employees in Nebraska.

Informally the state railway commission has ruled that employees of telephone companies who give the major portion of their time to the service of their companies, may be given free use of their companies' lines and telephones if the companies grant such privilege. The commission believes a strict construction of the state law might prevent this, but, basing its ruling on the anti-pass law, it believes free service may be given so long as it is not specifically prohibited by a new act of the legislature.

The commission has made an informal ruling prohibiting telephone companies from giving lower rates to stockholders than are given to non-stockholders. The commission believes returns to stockholders should be given in the form of dividends, and not in preferential rates for telephone service.

Suit to Limit Rates.

The city attorney of Vancouver, Wash., has been authorized to begin action against the Pacific Telephone and Telegraph Company to compel reduction of telephone rates. Some time ago the council passed an ordinance placing the maximum rental of residence telephones at $1.50 a month, and business telephones at $2. The telephone company paid no attention to the ordinance, alleging it to be unconstitutional. The council will let the courts decide. The Home Telephone Company which applied for a franchise in which the maximum rates for business telephones was $2.50, has agreed to accept a franchise providing for the lower rate if the court sustains the council. From this councilmen take it that the $2 rate is not unreasonable. Circumstances attending the origin of this movement make it probable that nothing will come of the action.

Franchises Overruled in Syracuse, N. Y.

The Independent Telephone Company, or the Onondaga Independent Telephone Company, as it is now known, and the People's Subway Company, which carries Independent lines, have obtained from Justice of the Supreme Court Filts of Albany, writs of certiorari to review their franchise tax assessments in Syracuse, N. Y.

The endeavor is to cut down the franchise assessment of the telephone company, now placed at $215,000 and the subway assessment which is placed at $115,000. The writs were served upon the State Board of Tax Commissioners.

The petitions for the writs both question the authority of the State Board of Tax Commissioners; claim the assessments are unequal and not the same ratio of other assessments in the city; that they are higher than the proportionate value of other franchises in the State. In the case of the subway, it is alleged that the commissioners failed to take into consideration that only 21 per cent of the subway constructed is in use by the company, or that the city is entitled to use free a large portion of the subway. In the telephone company petition it is claimed that only 50 per cent of the franchise property is in use, and the city also has part of it free.

The claim is made that the telephone company franchise is overvalued $55,000 and the subway franchise $68,500.

Messenger Fees Legal Under Anti-Discrimination Laws.

Assistant Attorney General Claude Pollard, of Texas, has advised the railroad commission that it is no discrimination for a telephone company to charge 10 cents extra on long distance calls where the person called for can not be reached by a local telephone, but it is necessary to send for him or her.

The question was asked the railroad commission by one who was not a telephone subscriber, and who insisted that the extra charge of 10 cents on each call was discrimination and a coercive attempt to compel people to become telephone subscribers.

Fined for Failing to Report to State Auditor.

At Frankfort, Ky., the Cumberland Telephone Company was fined $1,000. Under the revenue and taxation act of 1906 each foreign corporation is required to report to the auditor by July 1 of each year the amount of its capital stock, and holdings, in order that a license tax may be assessed and collected. This, the telephone company failed to do. The law provides a fine of $1000 and an additional fine of $50 a day for each day until the report is made. As this was the first offense for the telephone company, it got off with the $1,000 fine on confessing judgment.

Raising Rates at Guthrie, Okla.

At Guthrie, Okla., the city council has attempted to revoke two of the three franchises granted to various telephone companies, and transferred to the Pioneer company, which has a monopoly of the local field. It was discovered that the two franchises revoked contained clauses requiring their acceptance. The only one left still in force specified the rates at $1.50 for residences and $2.50 for business telephones. These are the rates which were in force until Sept. 1, when the company raised to $2 and $3. An injunction suit has been filed and a complaint lodged with the corporation commission.

Telephone Finances

Cuyahoga Report for August Shows Large Gains Over 1908.

The August statement of the Cuyahoga Telephone Company shows an increase in gross of $2,901.23 and a gain in net of $7,566.32 The large gain in net shows that the operating economies which have been in force for a couple of years back are still making progress. The net surplus for the common stock is at the rate of almost 12 per cent per annum while the net earnings are almost three and one-half times the bond interest. The returns compare as follows:

	August, 1908.	August, 1907.
Gross earnings	$68,775.99	$65,874.76
Total expenses	31,603.33	36,268.42
Net earnings	37,172.66	29,606.34
Interest on bonds	11,283.34	11,250.00
Surplus	25,889.32	18,356.34
Dividend on preferred stock	7,186.75	7,186.75
Dividend on common stock	.....	5,000.00
Res. for. depreciation	3,817.50	1,250.00
Total deductions	11,004.25	13,436.75
Net surplus	14,885.07	4,919.59

Returns on Investment in Fayette Home Telephone Co.

The Fayette Home Telephone Company operates exchanges at Lexington, Midway, and Versailles, Kentucky. The population of Lexington, given in the U. S. Census official estimate for 1906, was 29,250. The three exchanges serve at present a total of about 3,330 subscribers' stations, not including 342 extension telephones.

Securities of the company at present outstanding are as follows: Common stock, $300,000; preferred stock, $34,000; bonds 5 per cent, $300,000.

On the basis of the present number of subscribers' stations the bond investment per station amounts to about $90, and the fixed annual charges per station on account of bond interest to about $4.50. Gross earnings, as given in the report for the year ending June 30, 1908, were $92,021.39. Accordingly, on the basis of 3,163 stations, the number in service at the end of the fiscal year (a divisor which obviously gives results not quite fair to the company) the average yearly income per station was about $29.10.

Operating and maintenance expenses, including taxes, amounted to $57,129.52, leaving net earnings at $34,891.87, or about $11.03 per station. Deducting bond interest, $15,000, shows a balance available for dividends on preferred stock, and surplus amounting to $19,891.87, or after payment of dividends on preferred stock an actual surplus of $17,851, more than $5.60 per station.

This company declared, in 1906, two semi-annual dividends of 1½ per cent on common stock, but is now holding back dividends with a view to increasing the value of its bonds. The plant was constructed from the proceeds of the sale of common stock and bonds, par value $600,000, and since that time there has been put under the bonds the additional security, resulting from the sale of $34,000 preferred stock at par, and from sums reinvested from earnings, of $59,907.12, in extensions and betterments.

The company's surplus investment is at present represented by $28,400 par of its own bonds. Since the closing of the fiscal year, on June 30, all audited vouchers have been paid; the bills payable have been reduced 20 per cent and $92.00 par of the company's bonds have been purchased on surplus account.

The company's financial history for the past three months offers special evidences of strength. After charging off all operating and maintenance expenses, taxes, rents, etc., and then deducting the interest on bonds, the surplus showing is $2,122 for June, $2,265 for July, and over $2,300 for August, indicating a very healthy condition of expansion.

Two years ago the Home company states that it had in service about 2,000 stations, as compared with its Bell competitor's list of approximately 2,700. At about this time rates in the Bell exchange, which had originally been cut with the object of hampering the start of competition, were raised to the same figure as the Home company charges, and almost immediately the comparative strengths were reversed. The Bell company now claims in its directory about 1,300 telephones in Lexington, and according to local reports, it is doubtful if over 1,000 of these are used by paying subscribers.

The figures in the preceding statement, the accuracy of which is vouched for by Mr. Geo. S. Shanklin, president of the company, indicate that a statement made by the American Telephone & Telegraph Company, a competitor of the Independent company, in a recent issued pamphlet is wide of the facts in every item concerning the condition of the Fayette Home Telephone Company.

Which Is a Good Telephone Investment in Montana?

Bearing on the above question, the following letter called forth by a circular recently issued from the headquarters of a competitor of the company with which the writer is connected, is of interest:

The Telephony Publishing Co., Chicago, Ill.

Gentlemen:—My attention has been called to a pamphlet recently circulated by the American Telephone & Telegraph Company entitled "A Table Showing the Financial Condition of Some of the Independent Telephone Companies."

I note that this pamphlet recites, relative to Independent telephone companies in the state of Montana, substantially the following:

March, 1903, one company sold at sheriff's sale for $1,500.

July, 1903, one small ranch line placed in receivers' hands, amount involved not mentioned.

January, 1904, one lien filed for labor and materials, amount $764.

As compared with these few insignificant failures we have in the state of Montana, Independent telephone companies representing an investment of more than $2,000,000. Without exception these companies are all prosperous and control the bulk of the telephone business in their respective territories. Some of these companies paid dividends as high as 20 per cent during the year 1907, and all maturing bond interest was paid promptly.

It is also interesting to note that the construction of the Independent telephone companies in this state is of the highest order. Several companies have erected modern fire-proof buildings, have extensive systems of underground conduits, and use the highest grade of modern equipment obtainable.

The investors in Independent telephone securities in this state number more than one thousand. During the year 1907 the Rocky Mountain Bell Telephone Company (the Bell licensee operating in Montana) inaugurated an active campaign for the sale of its securities to local investors. The result of this campaign, involving an expenditure of several thousand dollars was the sale of securities amounting to only $3,200 of securities during the entire year of 1907. As against this, nearly $1,000,000 of securities of Independent telephone companies were sold in the state of Montana alone, to local investors.

I note that the pamphlet referred to mentions a few Independent telephone companies who passed their dividends in 1907, and the filing of liens on Independent companies is also mentioned. As the issuing of the pamphlet is intended to discourage investment in Independent telephone securities it may be interesting to note that the Rocky Mountain Bell Telephone Company passed its last dividend. During the year

1907, liens for a considerable amount were filled on its building in Butte to secure claims for labor and material.

According to the financial statement issued by the Rocky Mountain Bell Telephone Company early in 1908 the net earnings for the year 1907, of the telephone company, with an alleged investment of $9,000,000 were very little more than the net earnings of the Montana Independent Telephone Company, with an investment of $500,000.

Very truly yours,

THADDEUS S. LANE,

Managing Director, Montana Independent Telephone Co.

Butte, Montana, Sept. 22, 1908.

Telephone News

No Sale of Mississippi Valley Company.

Rumors have been diligently circulated in some parts of Iowa to the effect that the Mississippi Valley Telephone Company of that state, was intending to sell out to its competitor, the Iowa Telephone Company. When interviewed on this subject by a Keokuk newspaper man, Mr. Thomas Peebles, secretary of the Mississippi Valley Company, said: "There is absolutely no sale of the property of the Mississippi Valley Company of Iowa to the Iowa Telephone Company contemplated now or at any future time."

"So far as Keokuk is concerned," said Mr. Peebles, "we have, I am confident, one of the best plants to be found anywhere and much superior to plants usually found in cities of this size. We have more subscribers than at any previous time and they are paying a higher average rate. We have made a gain every month since last October when we opened our new exchange. Within fifteen days we will have new copper lines to Quincy, Springfield and St. Louis and intermediate points. I simply cite these gratifying increases to indicate the healthfulness of the company which removes any commercial reason for disposing of the plant."

New Toll Circuits in Ohio.

New circuits of the United States Telephone Company, the Independent long distance corporation of Ohio, making connections with the Independent long distance lines out of Detroit, will be completed in a few days, and will open practically the entire state of Michigan to the Ohio company. There will be five circuits on the Detroit lead. A new switching station at Crestline will be completed about the same time, and this will enable the company to handle more business between Columbus and Crestline and Lima. The three new circuits between Cleveland and Pittsburg through Youngstown will be completed within 90 days, and this will give the Ohio Independents additional valuable facilities for connection through to Pittsburg.

President Vail, of A. T. & T. Co., Says Competition Benefits Bell Companies.

An interview with Theodore N. Vail, president of the American Telephone & Telegraph Company, reported in the *Wall Street Journal* of Sept. 25, contains the following:

"Mr. Vail was perhaps most interesting in the discussion of the question, 'How are the local Bell companies faring in competitive territory?'

"'In most sections where there is competition it is found to directly benefit our companies,' he said. 'This may sound strange, but I mean it when I say that while the existence of two telephone systems in a city is a waste and a needless state of affairs, yet in most instances such a condition has been rather a benefit to the Bell companies.

"'In the first place,' he continued, 'the existence of a competing company of a sufficient size, does not interfere with our own development in that section; the positive benefit, however, arises from the fact that such a state of things insures the public that no extortion is being practiced, and that proper service is being maintained. Of course it benefits no one when business-like rivalry sinks into reckless competition and a sheer test of endurance, without regard to proper maintenance of plants and integrity of capital invested. In Philadelphia, for example, the Keystone company is possibly the best opposition that we encounter in the United States. I do not know that we could want this company wiped out. So far as we are concerned it keeps alive the feeling that a monopoly is being held in check.'

"Continuing along this line of thought, President Vail said: 'To my mind, the corporations of this country are entering upon a more hopeful day. Corporation managers are beginning to feel that a great deal of senseless hostility has passed, and the public on its part is now beginning to be conscious of the fact that the dangers of unreasonable corporation extortion have passed for all time. Nevertheless, the corporation is being held strictly to account and this is being achieved mainly through the quiet and peaceful operations of public opinion.

"'Perhaps the corporation is still being judged a little too harshly. The situation finds a parallel among churches. If a person conspicuously prominent in church work goes wrong, there is a certain tendency on the part of the public to take a fling at all churches and at all church members. If any single corporation is guilty of an error or misdeed, all other corporations good or bad share the odium. But in the coming more intelligent mood of the public this will gradually pass away.'

"President Vail was asked concerning the relation of the Mackay companies to the American Telephone & Telegraph. 'They are simply large holders of our securities,' he replied."

Of course, it is well known that the Mackay companies are extensive advertisers of the benefits conferred on the public as a result of competition in the telegraph business which followed the development of the Postal system. Apparently the heads of the great corporations who, by their opportunities for obtaining information, are enabled to take a broad view of a situation, and "the public," the individuals in which are only interested in personal benefits in the form of improved service and lower rates, are agreed on this question at last.

Idaho Farmers Company Has Experienced Rapid Growth.

An illustration of the development frequently resulting from the building of a neighborhood telephone line is furnished by the experience of the Farmers Independent Telephone Company, of Meridian, Idaho. In 1902 Homer Folleth and F. E. Madden built a private line from the Madden ranch, south of Meridian, out to the Wolfkill ranch, three miles north of the townsite. This line served some 18 families, and covered a route of eight or nine miles. Later a switch was put into a store in the town and the townspeople began to be added to the service. In a little while connection was made with the successful Independent company at Boise and a demand began to grow for a local switchboard and increased service. This led to the formation of a stock company in which $10,000 worth of stock was issued and readily subscribed.

At present the company is sole owner of a line to Kuna

in addition to the 100 miles of line which serves the immediate locality in which it began operations. The central office is equipped with a first class switchboard from which connection may be had with any Independent telephone in the state. Three operators and one lineman are constantly employed and additional help is often engaged for temporary work.

Two hundred and fifty subscribers are now receiving a satisfactory service, and the company is still growing.

Railway Telegraph Superintendents Indorse the Telephone for Train Dispatching.

At the recent quarterly meeting of the Western Division of the Association of Railway Telegraph Superintendents which comprises the railroads west of the Ohio River, the use of the telephone for train dispatching was most heartily indorsed. At the present time about 6,000 miles of railroads dispatch and block trains by the use of the telephone instead of the telegraph. Of this mileage about 4,000 miles of it is on the western railroads. It is expected that the telephone will gradually replace the telegraph for dispatching and blocking trains on all of the railroads which were represented at the meeting. A number of the roads have used the telephone for some time on parts of their systems and as occasion arises, the telephone will be installed on other divisions until it gradually supplants the telegraph throughout the entire systems. The following were present at the meeting in Chicago, which was held in the offices of the Chicago & Northwestern Railway: E. A. Chenery, Missouri Pacific R. R.; G. W. Dailey, C. & N. W. Ry.; A. J. Fry, C., M. & St. P. R. R.; P. W. Drew, Wisconsin Central R. R.; A. H. Ashald, Grand Trunk Ry.; G. A. Cellar, Pennsylvania Lines; E. H. Millington, Michigan Central R. R.; G. C. Kinsman, Wabash R. R.; E. J. Little, Great Northern Ry.; H. C. Hope, C., St. P., M. & O. R. R.; J. G. Jennings, C., R. I. & P. R. R.; W. W. Ryder, C., B. & Q. R. R.; H. H. Van Etten, Illinois Southern R. R.; C. Selden, B. & O. R. R.; J. L. Davis, C. & E. I. R. R.; J. B. Sheldon, Union Pacific R. R.; W. L. Connelly, C. I. & S. R. R.; W. S. Milton, Queen Crescent R. R.; C. H. Gaunt, Santa Fe R. R., and A. H. Jones, Santa Fe R. R.

The Telephone a Necessity.

Railroad companies have ordered telephones installed in their depots through the state of Oklahoma, generally, in compliance with the order of the Corporation Commission which handed down the following ruling in the case of Citizens of Skedee vs. Santa Fe Railroad, in which they ask for a telephone in the railroad depot: "A telephone in a depot where there is a telephone exchange in the town is a necessity for the convenience and use of the public and is a necessary part of the railroad equipment at a station."

The Columbus Directory.

The directory of the Columbus Citizens Telephone Company, past issues of which have been considered to be models of excellence, seems to have assumed a settled form, as few changes from the last number can be noted. The classifications, typographical arrangement, and placing of advertisements are generally known, through the publication of descriptive articles in the pages of the American Telephone Journal and Telephony.

Not only does the book contain the names of practically all the leading business houses and well known residents of Columbus, but its pages are enlivened by contributions from Shakespeare—whose foreknowledge of the coming of the telephone seems to be an important discovery which is to be credited to general manager G. R. Johnston, of the Citizens company. Macaulay, too, is represented on the title page by the following quotation:

"Of all inventions, the alphabet and the printing press alone excepted, those inventions which abridge distance have done the most for civilization."

The following verses, reproduced at the heads of one or another alphabetical division, draw attention to the issues that sometimes hang on quick communication or instruct the subscriber as to the proper use and etiquette of the telephone:

"I go, I go; look how I go;
Swifter than arrow from the Tartar's bow."

"I'll put a girdle round about the earth
In forty minutes."

"Therefore, since brevity is the soul of wit,
And tediousness the limbs and outward flourishes,
I will be brief."

"Making it momentary as a sound,
Swift as a shadow, short as any dream,
Brief as the lightning in the collied night."

"Her voice was ever soft,
Gentle, and low—an excellent thing in woman."

The closing quotation, "A word or two before you go. I have done the State some service, and they know it," may be taken either as an allusion to the general benefits

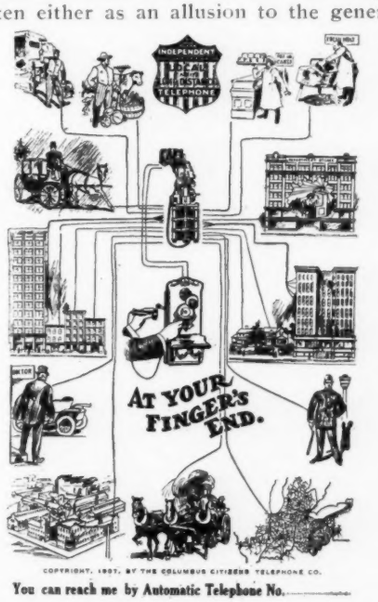


Illustration (Copyrighted) Which Appears in Directory of Columbus Citizens' Telephone Company.

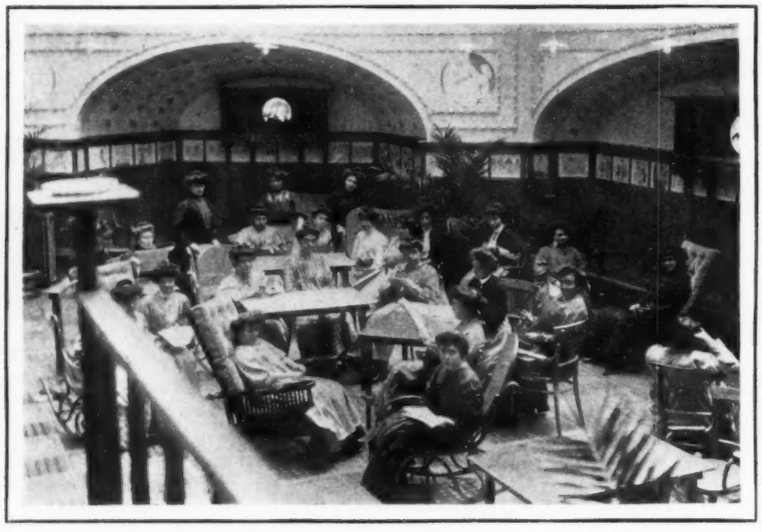
conferred upon the community by telephone service, or to the improvements in telephonic conditions in Columbus brought about through the competition and activity of the Citizens company.

Among the other features of special interest are the illustrations, graphically setting forth the value of telephone service, which appear at the back of the book. One of these, reproduced herewith, besides its publication in the directory has been reduced for postal card use. These postal cards have been distributed rather freely in Columbus, and it is said that they have taken fairly well with the youngsters making card collections.

This design has been copyrighted by the company, but any exchange managers who wish to use it may obtain cuts at a fair price, by writing to the owners of the copyright.

Rest and Dining Rooms for Telephone Operators in Paris.

Although the telephone service in Paris calls forth the unfavorable comments of all users, there is at least one point in which the management of the exchanges has achieved excellent results. The accompany illustrations show, respectively, the dining room and the rest room, which have been recently opened by M. Simyan, Under Secretary of State having charge of the Department of Posts and Telegraphs. These rooms, although not large, fulfill the requirements of comfort and convenience admirably. Especially is the decoration and furnishing of the rest room likely to contribute to the feeling of repose, the inspiration of which is its chief purpose. In the dining room, the idea of installing small separate tables was believed to present advantages, and has been adopted. Equipment is furnished for preparing light meals required by the operators, and gas stoves are set on a long table at the left of the room. Over these latter the operators may heat food which they bring with them from their homes. Milk, eggs and coffee are served in the dining room by the management.



One of the Operators' Rest Rooms in a Paris Exchange

The retiring room, for which several pieces of most comfortable furniture, which is likewise attractive in appearance, have been secured, is due to the designs of M. Binet, a well known architect, and several artists, decorators and designers of note who have contributed to make the room as attractive as possible.

These innovations as yet have only been introduced in a single central office, but M. Simyan has become so convinced of their value that he is already understood to be preparing to make similar arrangements in several of the other leading exchanges.

Fire Chief Prefers Telephone to Regular Alarm System.

In Rutland, Vt., Mr. C. E. McDermott, Chief of the Fire Department, has caused to be published in the local newspaper a request to use the telephone as a substitute for the regular fire alarm system wherever this is possible. The reason which he gives is that a telephone call enables the chief to determine at once just where the fire is located. There are many instances where a fire occurs in a part of the town where the water pressure is quite sufficient to handle the blaze, and it is unnecessary to send the engine, and, in this way, a telephone call not only makes it possible for the men to reach the scene of action more quickly, but reduces the expense of fighting fires.

The Value of District Meetings.

A good talk bringing out some of the features which make district association meetings contribute to the success of the companies whose managers are steady attendants was given recently by Mr. W. R. Barkdull, traveling secretary of the Missouri Independent Telephone Association. Among other things he said:

"Why should we have district meetings? Primarily, it is for the betterment of every exchange owner, for the strengthening and building up of every Independent operating company. I expect there are men here today who have never met before, but whose interests are identical, and whose systems should dovetail together and should form one strong company throughout the district. I presume the best and most lasting good we get from such meetings is the good fellowship and sociability derived in getting the warm handgrasp, the look in the eye and the personality of a face to face meeting. This getting acquainted with one another, if nothing else were accomplished, is well worth the time and money it costs. This interchanging of ideas, and discussing informally the common everyday subjects cannot fail to give us all new courage.

"Among the many things that can be taken up and threshed out are: more uniform rental rate; what to charge for switching farmers lines, and the interchange of business with the nearest exchange. Because of inexperience, or lack of fore-thought, many operating companies have no agreement as to boundary lines, thereby often encroaching into the territory of their neighbors. It is at these meetings such things should be taken up and satisfactorily settled. At these meetings the regulation of toll charges can be brought up; the "Central" problem, or the proper handling of service, which is what you are selling as your product to the public. This operator problem is one of the most important in the whole business. Many offices with poor equipment, but good operators, give better service than those with new equipment, but inefficient operators.

"Then here again we meet the ever-smiling supply man. We need to keep in mind the fact that it is the Independent manufacturer who is responsible for our existence today, and to him should be given our most liberal patronage, if we are to continue to have the privilege of purchasing in an open, competitive market."

Sacramento, Cal., Expects Competitive Telephone Service Again.

It is reported from San Francisco that the Home Telephone Company, now installing an extensive system in that city and Oakland, is to enter Sacramento in competition with the Pacific Telephone & Telegraph Company, which, at present, is the only company operating there. Until about a year ago Sacramento had competition in the telephone business, the Capital company maintaining lines there. That company sold out to the Bell company. Since then there has been much talk of inviting a new Independent company to enter the field, which has culminated in the present report.

Campaign Speeches by Telephone.

The following dispatch from Topeka, Kan., illustrates the part which the telephone is playing in the political campaign: "Rural telephones are now playing an important part in the campaign of all parties in this state. The latest idea is to put a huge phonograph into the operating room of a rural telephone

exchange and have records of campaign speeches turned on. Then the wires leading to the different grangers' houses are opened and the farmer can hear all, while shelling corn in the kitchen."

Southern Independents Organize.

The Southern Independent Telephone Association was organized at a recent meeting of representatives of telephone companies at Bainbridge, Ga. The convention was largely attended, the companies represented operating more than 16,600 telephones. As a result of this meeting it is expected that both local and long distance service will be improved. The next meeting of the association will be held Dawson, Ga., February 23, 1909. The following are the officers of the new association: President, Dr. J. G. Dean, Dawson, Ga.; W. N. Drake, of Pelham, secretary and treasurer; Dr. W. L. Moor, of Tallahassee, vice-president of Florida, and T. E. Gurr, of Bainbridge, vice-president of Georgia.

An Operator's Troubles.

That subscribers using the coin collector telephone are not the only ones bothered by it, is seen in the following story from the Philadelphia Record:

"Telephone girls are always giving me surprises," said one club man to another. "Sometimes when I realize that I have asked an extra favor and have been particularly snappy, I am pleasantly astonished by finding a very agreeable sweet-voiced woman on the end of the wire trying to do everything she can to assist me. On the other hand, I know I frequently approach the task of using the telephone with metaphorical bristles sticking out all over me; just because on some recent occasion 'Central' has taken advantage of my mild humor to call me down hard without any real reason for her actions. I'm reminded of all this just because I got a new jolt this afternoon.

"I called up a certain number, obeyed 'Central's' orders to drop the nickel in and found myself connected with the wrong people. 'Nothing in that,' you say. Well, I know it; that isn't the story. I got hold of the girl again, retold the number and waited. After a few seconds she announced, faintly, that she could get no answer. I asked her what she meant by making me drop my nickel and lose it like that, when she sprung her surprise. Very pleadingly she asked me to 'take some other number for my nickel, and telephone' Well, I just had to laugh. That is the queerest kind of substituting something just as good as that called for that I ever met."

September Meeting of Pittsburg Section A. I. of E. E.

At the September meeting of the Pittsburg section of the American Institute of Electrical Engineers, the following officers were elected for the ensuing year:

Chairman, W. Edgar Reed; secretary, B. P. Rowe; executive committee, C. B. Auel, B. Rutherfoord, F. Uhlenhaut, Jr., C. W. Davis, E. B. Tuttle, Ludwig Hommel.

Mr. F. D. Newbury abstracted J. L. Woodbridge's paper on "The Application of Storage Batteries to the Regulation of Alternating Current Systems."

Mr. R. L. Flanders read a paper on "The Relay Type of Load Regulators for Storage Battery Systems." He explained by diagrams how a relay can be used together with a battery to regulate the supply of alternating current through a rotary converter to produce a satisfactory supply of direct current.

Mr. J. L. Davis discussed Mr. Fessenden's paper on "Wireless Telephony." He explained how the energy began to flow out into space from the antenna harp when the frequency became 85,000 and from that on to 100,000 the energy radiated increased from 0 per cent to nearly 100 per cent. He also explained the design of a high frequency generator, the arrangement of Poulsen's arc and the marginal method of tuning invented by Fessenden.

Mr. E. B. Tuttle spoke of the method of relaying telephone messages from wire lines to wireless transmitters and vice versa.

Mr. S. P. Grace, in the discussion, spoke of the progress made in telephony. He started with the first form of telephone, that of iron rods driven into the ground outside of forts to indicate to the defenders any attempt of an enemy to tunnel into the fort and showed what rapid progress had been made in the art. He referred to some early letters on the invention of the telephone, written by Mr. T. A. Edison to Mr. T. B. A. David.

Escaping Prisoners Caught by Means of the Telephone.

The report comes from Fort Sill, Texas, that the telephone played an important part in the recapture of two military prisoners who recently made their escape. The prisoners overcame and disarmed the sentry who was guarding them, and forced him, at the point of his own revolver, to accompany them a distance of seven miles from the fort. He was then liberated with the remark that it would be two hours before he could run to the fort and give the alarm. Unfortunately for the prisoners, there was a farmer living nearby who believes in modern ideas and hence had a telephone in his house. The sentry went to this house and obtained telephonic communication with the post guardhouse. The result was that a troop of cavalry was in pursuit of the runaways within a very few minutes, and captured them late in the evening.

New Telephone Rate Order in Oklahoma.

At the hearing last week before the Corporation Commission on proposed order No. 31 of the commission which provides that no person, firm, company or corporation conducting a telephone exchange in the state of Oklahoma can increase the rates without first having the consent of the commission, but one company was represented, namely, the Pioneer Telephone Company. It agreed that the order be issued temporarily. The company is in doubt as to the commission's authority to issue an order of that nature and will oppose the making of a final order to that effect, only upon that ground. This order of the commission will stop the Pioneer company from its attempt to raise the rates in all the large cities where it has exchanges, until the consent of the commission can be obtained.

A Lunch Room in a Paris Telephone Exchange Building.

Concerning the Merger of Ohio Independent Companies.

It has been asserted that the consummation of the pending arrangements for a merger, under lease, of important Independent properties in Ohio, will clear the United States and Cuyahoga Telephone Companies of debt. This will be done through the setting aside of a $1,000,000 guarantee fund for purchasing securities of the two companies by the new corporation. Selling at 80, about $800,000 of the bonds will be required to take care of the floating debt of the companies, $400,000 for each. This would leave $360,000 which, perhaps, could be used for the purchase of additional bonds, the money to be used in improvements. These bonds will probably be placed in the hands of a trustee as a guarantee that the interest on the bonds of the three companies be paid, and after this, the dividends on preferred and common stock.

Measures will be taken to prevent the sale of stock to any one connected in any way with the Bell interests, it is said. This is done to prevent the company from coming into the control of the competing company. The securities of the leasing company will be sold to other Independent companies in order that they may have the greatest possible interest in it and its welfare.

James S. Brailey, Jr., has denied the rumor that it is the intention to do a telegraph as well as telephone business. He says that the United States Company has a number of wires leased to telegraph companies and perhaps will continue to lease them, as the rentals amount to about $50,000 per year. Other than this, there is no intention of entering the telegraph field.

Home Telephone Company at San Francisco Receives New Support from Strong California Capitalist.

Announcement has been made by the Home Telephone Company, of San Francisco, Cal., that Henry E. Huntington, one of the best known men of great financial strength in California, has become interested in its securities, having acquired holdings of about $1,000,000.

This statement is made on the authority of William Thomas, senior member of the firm of Thomas, Gerstle, Frick & Beady, of counsel for the company. Mr. Huntington is well known in the electric railway field on account of his extensive and successful work in the development of suburban trolley interests in the vicinity of Los Angeles. It is also known that he is a heavy investor in Independent telephone companies in southern California.

Although newspaper reports intended to cast doubts upon the validity of the franchise of the Home Telephone Company have been circulated recently, it is understood that Mr. Huntington's investment, following a statement by Dillon & Hubbard, of New York, that the franchise is perfectly good, definitely sets at rest all such rumors.

Southern Bell Adopts Functional Type of Organization.

On September 1 the Southern Bell Telephone & Telegraph Company changed its organization from the territorial basis to the functional basis. The new organization is similar to that put in effect by the New England Telephone and Telegraph Company which was described in a recent issue of the American Telephone Journal.

Mr. J. E. Brown will continue in charge of the operating department. The following are the new appointments: J. R. A. Hobson, acting general commercial superintendent, formerly superintendent at Norfolk, Va.; F. E. Montague, general traffic superintendent, formerly superintendent of exchange traffic; T. L. Ingram, general plant superintendent, formerly general superintendent of construction; Geo. J. Yundt, chief engineer, formerly engineer; M. O. Jackson, special agent, unchanged.

The division commercial superintendents are W. B. Roberts, Atlanta; F. L. Woodruff, Montgomery, Ala.; David Laird, Savannah, Ga.; W. T. Williamson, Charleston, W. Va.; J. W. Crews, Richmond, Va.; M. B. Speir, Charlotte, N. C.

The division traffic superintendents are, H. N. Rufe, Atlanta, Ga.; J. C. Thompson, Montgomery, Ala.; L. E. Winget, Savannah, Ga.; John Brown, Charlotte, N. C.; W. F. Achenbach, Richmond, Va.; and W. T. Williamson, Charleston, W. Va.

The division plant superintendents are H. O. Riley, Atlanta, Ga.; E. D. Henthorne, Birmingham, Ala.; E. R. Crews, Savannah, Ga.; N. O. Wood, Charlotte, N. C.; R. L. Wright, Richmond, Va., and W. C. Wright, Charleston, W. Va.

Other appointments are, D. M. Therrell, assistant general traffic superintendent; Chauncey Smith, traffic engineer; W. H. Adkins, general contract agent; J. W. Gibson, superintendent of supplies; Kendall Weisiger, assistant chief engineer; D. F. McClatchey, special agent to general manager; W. G. Rauch, W. L. Hodges and F. A. Webster, special agents to the general plant superintendent; W. W. Delaney, superintendent of equipment, and L. B. Thompson, general wire chief.

Rural Telephone Companies Support Independent Request for Increased Rates.

At Wichita, Kan., the petition of the Independent Telephone Company to the city council, for permission to raise its rates, is being strongly supported. Mayor Graham, who has in his possession the report of a committee which investigated the books and plant of the company some time ago, admits that the rates are too low to allow the company to make a profit, and give the same grade of service furnished at present, and favors a slight increase in rates.

Owners of rural lines serving about 4,000 subscribers have forwarded to the council a petition stating that unless the ordinance granting the increase in rates is granted, their competitor, the Bell telephone company, will gain control of the business in Wichita, and beneficial competition will be destroyed; also that their own interests, and those of their subscribers, are best served by the continuance of connection with the Independent company, which will only be possible if the latter is allowed to put in force a new scale of rates which will produce a proper income.

A. T. & T. Co. Preparing to Take Over Western Electric Minority Stock.

Efforts are being made, it is said, to reconcile minority stockholders in the Western Electric Company to payment for their shares in A. T. & T. Company's convertible bonds. An option on these shares was secured in December, 1907, prior to which time the American Telephone & Telegraph Company owned $9,012,000 or 60.08 per cent of the $15,000,000 Western Electric stock outstanding. As a result of its offer about 50 per cent or $3,000,000 of the $6,000,000 minority stock was delivered under agreement that the parent company was to make payment on or before October 15, 1908.

"The only matter which remains to be settled," says the *Wall Street Journal*, "is as to whether the American Telephone Company shall make payment in cash or in the 4 per cent convertable bonds. According to its offer the telephone company reserved to itself the right to pay for this stock either in cash at $225 per share or in 4 per cent convertibles at the rate of $250 per share of Western Electric."

And then the *Wall Street Journal* goes on to tell how nice it would be for the Western Electric stockholders if they should be paid in the bonds.

One Way of Preventing Telephone Wires from Being Cut by House Movers.

Mr. C. C. Deering, of the New Independent Long Distance Telephone Company, at Omaha, has hit upon a new scheme for thwarting the thresher men, house movers and others who have heretofore been accustomed to cutting telephone wires at high-

way crossings. Mr. Deering stretches a 5-16-in. messenger strand across the highway a couple of feet below the telephone wires and has it strongly guyed at either side by cable clamps. Any one wishing to pass beneath Mr. Deering's wires and messenger strand finds it absolutely necessary to call up the telephone headquarters first, as they do not care to risk cutting the messenger. As this gives the telephone company a chance to save the wires, the management is always glad to respond quickly with a gang of linemen who loosen the clamps and elevate the wires and strand.

International Association Refutes Statements in A. T. & T. Report for 1907.

A bulletin, prepared by Gansey R. Johnston, general manager of the Columbus Citizens Telephone Company of Columbus, Ohio, vigorously calls to account the statements in the last report of the A. T. & T. Company concerning Independent companies, competition, etc. It sets forth the true reasons for increases in rates, and mentions the many benefits accruing to the public through competition.

This bulletin will be widely distributed among banks and investors. It is probable that partial reprints will appear in future issues of TELEPHONY.

The Virginian Railway Adopts Telephone Train Dispatching.

The Virginian Railway is the first large railway system to install the telephone for train dispatching throughout its entire length.

Before deciding to install the telephone a thorough examination was made of the system and many tests demonstrated its superiority over the old method of moving trains by telegraph.

Addition to International Association Stamp Users.

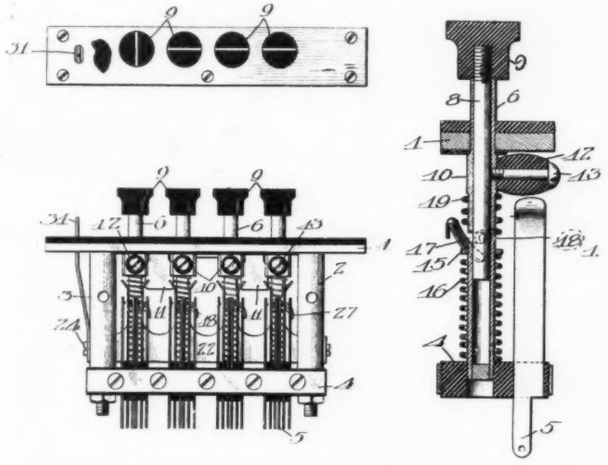
The name of the Stackpole Battery Company, St. Mary's, Pa., should be added to list No. 3 of users of the stamps of the International Independent Telephone Association.

Telephone Patents

PARTY LINE INDICATING KEY.

Clifford C. Bradbury, Chicago, Ill., patent 899,024, Sept. 22, 1908.

Party line indicating ringing keys designed to give positive indication to the operator as to the button last depressed are described by this patent. The upper, or flat, surface of each button is provided with a white line and the mechanical structure of the device is so arranged that the last button depressed rotates one-fourth of the way round in its return from actuated to unactuated position and remains in its rotated position with the white line standing at right angles to its normal position until another button is depressed. By this arrangement the operator if requested to ring a second time on a telephone party line can by a glance at the indicating key observe which of the keys was last depressed. The rod, 8, of each plunger is provided with a pin, 18, which when the button is depressed engages the cam, 27, and is rotated through an angle of 80 degrees to occupy its alternative position. When another key is depressed, this key is restored to its normal position. The



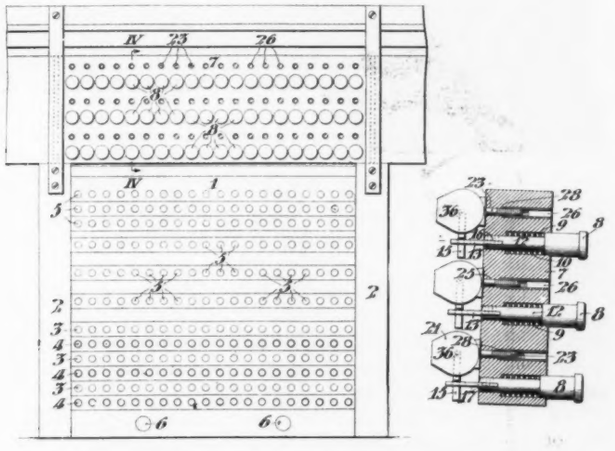
plate, 22, is provided with the extended finger, 31, which passes through a slot in the top plate so that if it is desired, the operator may at any time release the last button depressed from its indicating position without depressing another button. This provision is ordinarily not necessary, unless all four of the buttons are simultaneously depressed. Whenever any other button is depressed, the action of the spring, 19, when the plate, 22, is pressed outwardly, rotates the button, 9, back to its normal position.

TELEPHONE SWITCHBOARD CALL REGISTER.

Charles E. Wilson, Philadelphia, Pa., patent 899,278, Sept. 22, 1908.

This invention is designed to provide the switchboard operator with means for registering at the switchboard the various completed calls as they are made by subscribers, thus doing away with the ordinary paper and pencil method of making such registrations.

The illustration represents the face of a multiple switchboard as it appears before any particular operator. At the top of the switchboard is an additional panel which is shown in this instance as cut out of the switchboard framework and each panel is provided with push buttons, 8, adapted to operate counter



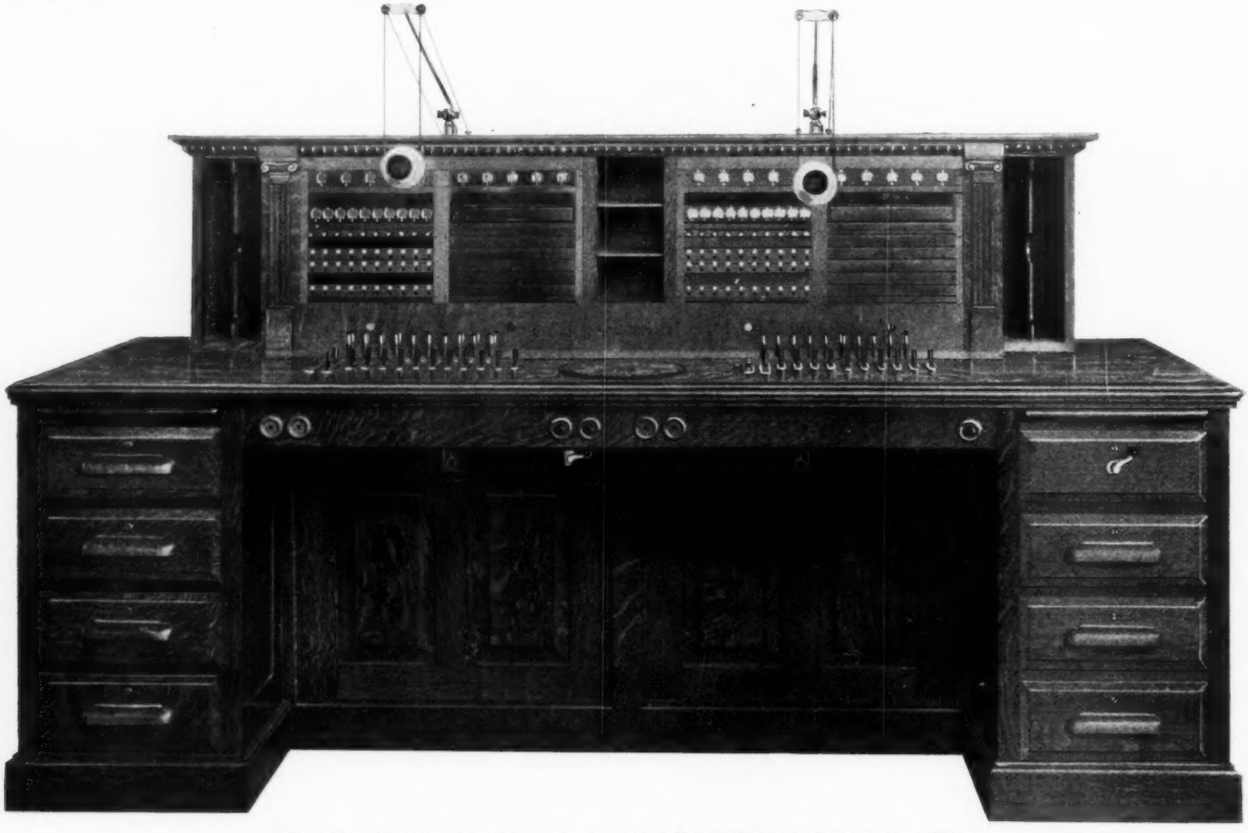
mechanism, 21. Whenever a call is completed, the operator actuates the button, 8, corresponding to the calling subscriber, thus registering a call for him. It will be noted that the push buttons 8 are arranged in such a manner that they correspond each to each in their respective positions with the corresponding positions occupied by the answering jacks 3.

In the Manufacturing Field

The Wallace, Idaho, Toll Desk.

In last week's issue a description was given of the switchboard furnished the Northern Idaho Telephone Company at Wallace, Idaho.

In addition to the regular switchboard equipment, the Stromberg-Carlson Telephone Manufacturing Company also supplied a two-position toll desk as shown in the illustration. Each position is wired for an ultimate capacity of 20 toll lines, the lines appearing in each position also being multipled in the adjacent position. A lamp located above each answering and multiple jack is so wired as to glow continuously while a line is in use, providing a "visual" busy signal. Associated with each line is also a night switching key by means of which the line may be transferred to the first position of the main board for night service. An ultimate of 20 trunks, with 10 equipped, are also provided in each position for interconnection with the main switchboard.



The Two Position Stromberg-Carlson Toll Desk Shipped to Wallace, Idaho.

The keyboard and operators' circuits on the toll desk are quite similar to those previously mentioned in connection with the night position of the main board, consisting of the usual "toll to toll" cords, with repeating coil keys, "toll to central energy" cords, master and order wire keys.

The desk itself, of which a large number have been installed for this class of work, is of quarter sawed oak with a golden oak finish, and besides the roomy drawers at either end of the cabinet, is provided with calculagraph space, roomy book stalls, and pigeon holes for toll tickets.

THE AMERICAN CABLE CLIP COMPANY, 132 Prince St., New York city, has just issued a new catalogue. It illustrates and describes the American, Standard and Economic cable clips, the Economic pole cable switch for passing cable by the poles when it is being strung, and other telephone line specialties.

"Secret Service" Systems for Rural Lines.

That "Secret Service" continues to receive attention from operators of rural lines is evidenced by the orders reported by the Baird Manufacturing Company, 1602 North Halsted Street, Chicago, Ill., for the party line secret service system which it manufactures. A considerable number of these orders are understood to be from persons who have already equipped some of their lines with this system.

THE HARVARD ELECTRIC COMPANY, 66 W. Van Buren Street, Chicago, Ill., and 136 Liberty Street, New York, N. Y., announces that although its Chicago factory and stock was seriously damaged by a fire which occurred August 28, its new factory at Chicago, equipped throughout with modern and improved machinery, is now in full operation and that orders for fuse wire, fuse links, telephone fuses, conduit boxes, sectional switch boxes, portable lamp guards, wire connectors, brass cleats, etc., will be filled promptly.

The well known high standard of "Harvard Specialties" will not only be maintained as in the past, but will be heightened by new methods and improved means of manufacture.

THE DEAN ELECTRIC COMPANY, Elyria, O., is installing a considerable number of its new frequency meters, and its customers find that their use is advantageous in enabling them to maintain proper adjustment of equipment for furnishing current for harmonic ringing.

Condensed News Reports

Officers of companies are earnestly requested to forward us promptly all financial and other statements as soon as issued and any items of interest as to their plants and systems

PERSONALS.

MR. W. A. SCOTT, Frankfort, Ky., has recently taken charge of the Owenton telephone system.

MR. J. C. RAMAGE of Providence, Ky., has been appointed manager of the Seymour Home Telephone Company, Seymour, Ind.

MR. F. L. HARRIGAN has been appointed manager of the Northwestern Telephone Exchange Company's exchange at Royalton, Minn.

MR. ARTHUR WADE, formerly manager for the Cumberland Telephone Company at Monroe, La., has been promoted to the position of manager of the company's exchange at Fayetteville, Tenn.

MR. J. D. JACOBS, of Nashville, Tenn., has been appointed manager of the Cumberland Telephone Company's exchange in Owensboro, succeeding Mr. R. Field, Jr., who has been appointed manager of the company's exchange at Memphis.

NEW COMPANIES.

CLAYTON, N. MEX.—Some of the business men of this place are forming a company to build a telephone line from Clayton through Brown Post Office to Central City. From Central City the lines will run through Cone, Rosebud Valley, Dale, Ione, Ohmego, into Nama Visa.

MAHONING, PENN.—The Mahoning Rural Telephone Company was recently organized. The company is capitalized at $5,000 and the temporary officers are: President, W. A. Wertman; secretary, E. E. Wessner; treasurer, Jacob Zehner.

Application will be made for a charter as soon as the papers can be prepared.

WAYMART, PENN.—The Keen's Pond and Steene Telephone Company has been organized and the construction of its system is to begin at once. It is understood that Carbondale patrons of the American Union System will connect with the lines of the new company at this place.

ROMNEY, W. VA.—The People's Mutual Telephone Company, of this place, has been incorporated with a capital stock of $10,000. The incorporators are: J. D. Byre, W. N. Gughrie, James C. Heath, K. Taylor, J. M. Millison and C. H. Cookus.

FREDERICKSBURG, VA.—The Fredericksburg and Wilderness Telephone Company has been incorporated with a capital stock of $1,000. The officers of the company are: President, T. F. Morrison, Spotsylvania; vice-president, R. A. Jennings, of Orange, Va.; secretary and treasurer, W. W. Thornburn, Spotsylvania county.

MADISON, WIS.—The Cady Telephone Company of Wilson, St. Croix county, has been incorporated with a capital of $5,000. The incorporators are S. L. Pickett, G. W. LaPointe, Jr., Martin D. Erickson and others.

TORONTO, ONT., CANADA.—The Farmers Long Distance Telephone Company, Limited, has been incorporated with a capital stock of $40,000. The headquarters of the company will be in Blenheim, Ont.

TORONTO, ONT., CANADA.—The Hawthorne Hill Rural Telephone Company, Limited, has been incorporated with a capital stock of $10,000. The headquarters will be in Palmerston, Ont.

GUANAJUATO, MEX.—The Mexico City capitalists have formed a company to install a telephone system in this city. The company has obtained the right to erect poles and construct lines. A number of local merchants and others have subscribed for the new company.

PUEBLA, MEX.—Alejandro M. Azan is organizing a new telephone company to be capitalized at $400,000, to install a new underground telephone system in Puebla. A franchise has been applied for and it is believed that it will be granted within a few weeks as the new company has the support of the Chamber of Commerce. The construction is expected to be commenced within two months.

FINANCIAL.

COLUSA, CAL.—A trust deed has been filed with the county recorder, whereby the Colusa County Telephone Company mortgages its holdings to the Union Trust Company of San Francisco for $85,000. It is stated that the funds to be raised are to be used in making extensive additions and extensions to the company's system.

CRAWFORDSVILLE, IND.—The Home Telephone Company has increased its capital stock for the purpose of securing funds with which to make improvements, install new equipment and extend the lines.

CINCINNATI, OHIO.—The Lemoyne Telephone Company, of Lemoyne, Ohio, has increased its capital stock from $2,500 to $10,000.

FRANCHISES.

BAKERSFIELD, CAL.—J. C. Danner has been granted a franchise to construct a telephone line along the county road from Isabelle to Weldon.

DE KALB, ILL.—The Exchange Telephone Company has obtained franchises to establish switchboard exchanges in Sycamore and Lee.

MARTINSVILLE, IND.—The Martinsville Home Telephone Company is asking the city council for a new franchise to run for 25 years. The franchise provides for the increasing of rates from $1.00 to $1.25 a month for residences, and from $2.00 to $2.25 a month for business and office telephones up to 1,000 telephones; over that number, an additional increase of 25 cents on each telephone is to be permitted.

The present franchise was granted in 1895, and has twelve years more of life. The purpose of the increased rates is to rebuild and re-equip the plant. Without an increase over present rates the improvements contemplated would not justify the expense.

GOLCONDA, NEV.—The Golconda Telephone and Power Company has applied to the county commissioners for a franchise in Gold Run township.

ORVILLE, OHIO.—The Wayne County Telephone Company has applied for a franchise in Wooster.

MILL HILL, PENN.—The Nittany Rural Telephone Company has been granted permission to erect poles and string wires in this village.

SINTON, TEXAS.—J. J. Greathouse has been granted a franchise to construct a telephone system along the public highways.

NORTH YAKIMA, WASH.—W. T. White and C. W. McCormick have applied to the county board for a franchise to construct a telephone line in the lower Naches Valley.

WENATCHEE, WASH.—The Farmers' Telephone and Telegraph Company of this city have applied for a franchise to erect poles and construct lines along all the highways in Chelan county. It is expected that the franchise will be obtained without any difficulty.

CONSTRUCTION.

PHOENIX, ARIZ.—The People's Independent Telephone Company expect to begin constructing lines in the Creighton district within a short time.

OAKLAND, CAL.—Work has been resumed on the new exchange of the Home Telephone Company and it is the company's intention to rush the work as much as possible.

RED BLUFF, TEHAMA COUNTY, CAL.—S. M. Bayles of the Reed's Creek section, west of this place, is endeavoring to interest the farmers in that vicinity in the building of a farmers' telephone system.

COEUR D'ALENE, IDAHO.—The Interstate Telephone Company is constructing a second line to St. Maries.

LEWISTOWN, IDAHO.—The Fraser Telephone Company, which was recently incorporated, will take over the telephone line between Fraser and Greer and construct about 20 miles of new line.

BELVIDERE, ILL.—The Boone County Rural Telephone Company has just completed several rural telephone lines, adding 25 new subscribers to its exchange.

MORTON, ILL.—The material for the new telephone system of the Farmers' Mutual Telephone Company has been received and line construction will begin at once.

DUNLAPS, IND.—A new switchboard is being installed in the exchange of the Dunlaps Telephone Company. The outside plant is being overhauled and other improvements made.

OSSIAN, IND.—The Home Telephone Company has been making many improvements in its system. A new rural line has just been completed.

GRAND RAPIDS, MICH.—The Citizens' Telephone Company is contemplating the erection of a new building to take care of its increased business.

NEGAUNEE, MICH.—Work on the extension of the Marquette County Telephone Company on its Swanzey system is progressing rapidly. The lines have been extended from Negaunee by way of Palmer and will be of great benefit to the mining men in this region.

ADRIAN, MINN.—A telephone line in Little Rock county connecting with Adrian is being agitated.

BUHL, MINN.—The installation of the new switchboard in the local exchange has been completed.

CHISHOLM, MINN.—The Mesaba Telephone Company has ordered a 150 line switchboard which is to be installed in the local exchange.

ELGIN, MINN.—A number of improvements have been made in the telephone system in this village. Practically all the party lines have been exchanged to private lines and other changes have been made.

ERHARD, MINN.—The Erhard Telephone Company expects to construct about 12 miles of new line during the fall.

ROCKDALE, MINN. (R. F. D. from Byron).—The lines of the Farmers' Telephone Company in this vicinity are to be extended.

ROGERS, MINN.—The Rural Telephone Company is constructing an extension to its main line.

TWIN VALLEY, MINN.—The Faith Telephone Company intends to reconstruct its lines to Mahnomen and Waubun, thereby giving these towns first-class toll service. Mr. H. E. Grutlie is manager of the company.

WHEATON, MINN.—The telephone line to Herman will be constructed jointly by the Minnesota Telephone Company and the Lake Valley Farmers' Telephone Company.

CARLSBAD, N. M.—The Public Utilities Company of Carlsbad is extending its telephone line to Rocky Aroya, about 20 miles northwest of this place. It is quite likely that the line will be extended to the Guadaloupe mountains, about 60 miles from here.

NEW YORK, N. Y.—The German Imperial Post Office Department is to begin within six months the construction of direct long distance telephone lines with a number of places in Norway and Sweden. All the boards of trade of the German Empire have united in petitions for the immediate creation of long distance telephone lines between Berlin and Stockholm and Gothenburg. At present telephonic connection is had between Berlin and those places by way of Copenhagen. The chief of the Telephone Construction Bureau of the German government has filed a report urging that contracts for copper wire be placed while the copper producers are making prices which cannot be maintained any longer than the general quiet state of international trading exists. The amount of copper that will be required for the proposed enlargement of Germany's Imperial Post Office Department long distance telephones is estimated at 16,000,000 pounds of electrolytic.

SYRACUSE, N. Y.—It is reported that the Onondaga Telephone Company within the next 90 days will spend $350,000 on completing its system in this city. Most of the material for the work has been obtained and work will be started at once.

FAIRDALE, N. D.—It is expected that the local telephone system will soon be placed in operation.

HILLSBORO, N. D.—The Traill County Telephone Company is installing a new switchboard in its exchange at this place. Other improvements are also being made.

MARMARTH, N. D.—The Dakota-Montana Telephone Company is constructing a telephone line between this place and Lemon, S. D.

NEW SALEM, N. D.—There is talk of constructing a telephone line to Lemon, S. D., via Pretty Rock and Carson.

GRAND RAPIDS, OHIO.—Grand Rapids Mutual Telephone Company intends to install a new 100 drop switchboard in its exchange at this place. Mr. W. K. Evans is secretary.

HURON, OHIO.—The Mutual Telephone Company has resumed work on the construction of its system and expects to have it soon in operation.

PORTLAND, ORE.—A telephone line will be constructed from Sandy to the toll gate and possibly to Government Camp, within the next six months. It will connect with Welches, Rhododendron Tavern, Government Camp and the many summer homes that have recently been built on the Mount Hood road, between Sandy and the toll gate.

FAYETTE CITY, PENN.—The Independent Telephone Company, recently incorporated, has already made plans for the installation of a switchboard equipment in this place for 350 lines and a modern outside plant.

LINDEN, PENN.—A new private telephone line has been constructed by the Linden-Salladasburg Telephone Company extending to the Torrence Marshall place up Daugherty's Run.

MAHONING, PENN.—The Mahoning Rural Telephone Company intends to construct a line to Tamaqua along the public road branching off at Mantzville and going to Andreas and south to the Potts Power Company's works below Reynolds.

McVEYTOWN, PENN.—Ferguson Valley Farmers' Telephone Company, recently organized by J. C. Shahen, L. J. Ruble, M. F. K. Swigart and H. M. French, is soon to begin the construction of telephone systems in McVeytown and throughout Ferguson Valley, Lewistown, Huntingdon, Atkinson Mills and other places.

ARMOUR, S. D.—The lines of the Armour Telephone Company are to be extended.

DALLAS, S. D.—A telephone company has been organized to construct a line from this place to Rosebud Agency.

FREDERICKSBURG, VA.—The Fredericksburg and Wilderness Telephone Company is to install a telephone line in the counties of Spotsylvania, Orange, Culpepper and Louisa.

NORFOLK, VA.—It is reported that the Virginian Railway will at once install a private telephone line throughout its entire system for the purpose of dispatching trains.

BELLINGHAM, WASH.—The Home Telephone Company of this city has opened its long distance line to Seattle. The company now has direct communication to Seattle and all the intervening large towns.

BRIDGEPORT, W. VA.—The Belmont Telephone Company has started the installation of a new switchboard in its exchange in this place.

ATLAS, WIS.—The Equity Telephone Company is rapidly completing the installation of its system. A number of the rural lines have been completed and connections made with the various farms.

WASHBURN, WIS.—The Home Telephone Company's exchange of his place was damaged by a recent fire.

KAMLOOPS, B. C.—Duncan Ross has received word from the Department of Public Works, Ottawa, Ont., that arrangements will at once be made for the construction of the long distance telephone line from Kamloops along the North Thompson River.

ELECTIONS.

MELBOURNE, FLA.—At a recent meeting of the Tropical Telephone Company, the following officers were elected: President, L. A. Peck; vice-president, G. T. Pattison; secretary, C. G. Campbell; treasurer, F. O. Drake. The board of directors is made up of the above officers and J. Helseth.

CHENOA, ILL.—South Chenoa Telephone Company has elected the following board of directors: B. F. Elfrink, W. R. Shinn, J. N. Gentes, John Parsons, John F. Johnson. The company, after incorporation, will be known as the Chenoa Telephone Company.

DE KALB, ILL.—The following officers have been elected by the directors of the Exchange Telephone Company: President, B. W. Lion; vice-president, George Dick; secretary and treasurer, M. S. Campbell.

HILLSBORO, ILL.—The following officers have been elected by the People's Mutual Telephone Company: President, G. D. Haller, of Litchfield; vice-president, B. F. Stead, of Farmersville; treasurer, A. H. Vandever, of Nokomis; secretary and manager, R. R. Barnard, of Nokomis.

LAFAYETTE, IND.—At the annual meeting of the stockholders of the Lafayette Telephone Company the following board of directors was re-elected: Wm. Horn, Dr. V. Burt, Leopold Dryfus, William R. Wood, O. B. Friburg, W. S. Baugh, E. A. Taylor, Thomas Duncan and J. P. Haywood. The following officers were also re-elected: President, Wm. Horn; vice-president, Dr. E. V. Burt; secretary, O. P. Friberg; treasurer, W. S. Baugh; counsel, George P. Haywood; manager, F. O. Cuppy.

MAPLE GROVE, KY.—At a recent meeting of the stockholders of the Trigg County Telephone Company, the following officers and directors were elected: President, G. S. Dawson; vice-president, Dr. J. H. Lackey; treasurer, J. D. Guier; secretary, John T. Bridges; directors: Walker Redd, G. A. Bridges, J. D. McBride, T. F. Downs, Samuel Lancaster, J. J. Thomas, J. M. Vinson, W. T. Cunningham, and E. A. Shalar.

PORTLAND, TENN.—The Home Telephone Company has elected the following officers: President, R. D. Moore; vice-president, F. L. Link; secretary, Bascom Simmons; treasurer, J. W. Martin; directors: R. D. Moore, W. F. McGlothlin, H. M. Moore, J. W. Jones, G. W. Venters, M. B. Perdue, S. W. Brown, J. T. Durhan, James Durham; manager, J. A. Salmon.

MISCELLANEOUS.

RIVERTON, IA.—Sherman Smith has sold the Independent telephone system to E. King, who will take possession at once.

CONCORDIA, KAN.—The New Hope Telephone System, a farmers line which has been fighting to get into this town for several months, has announced its intention to build without a franchise, placing its poles on private property.

IDANA, KAN.—Fred Kitchener has purchased the local telephone exchange of Harvey Duncan, the consideration being $2,500.

HAMILTON, N. DAK.—The Citizens' Telephone Company is contemplating extensive improvements on its system and also the building of a number of farm lines.

SPARTA, TENN.—The headquarters of the Gainesboro Telephone Company will be removed from this place to Cookeville, Tenn., on the 15th of the month.

PORT ARTHUR, ONT., CAN.—The Bell Telephone Company has again notified the civil authorities that it is willing to sell out its system here for $4,000, providing Fort William purchases the system in that city.

UNDERGROUND.

CRAWFORDSVILLE, IND.—The Home Telephone Company has applied for a permit to place its wires underground.

OSKALOOSA, IA.—The conduits for underground system of the Home Telephone Company is about completed and the work

Samuel G. McMeen — Kempster B. Miller

McMeen & Miller

Telephone Engineers
Plans, Estimates, Evaluations, Reports
Consultation Supervision

1454-1458 Monadnock Block . . . . . CHICAGO
787 Market Street . . . . . SAN FRANCISCO

Samuel G. McMeen — Kempster B. Miller

McMeen & Miller

Patent Solicitors and Patent Experts

In connection with our telephone engineering practice we make a specialty of securing electrical patents for inventors, and of giving expert advice in patent matters. We also have facilities for marketing meritorious inventions.

1454-1458 Monadnock Block . . . . . CHICAGO
787 Market Street . . . . . SAN FRANCISCO

W. H. CRUMB & COMPANY

Engineers : : Contractors

Telephone Engineering and Construction
Plans, Specifications and Estimates Promptly Furnished

835 Monadnock Bldg., Chicago, Ill.

JONES & WINTER

INDEPENDENT

Telephone Engineers and Contractors

1259 Monadnock Building, CHICAGO, ILL.

Write for Our References

H. A. JOHANN — O. R. JOHANN

JOHANN & JOHANN

Cable Experts
Installers of Switchboards and Cable Apparatus

COMPLETE EXCHANGE CONSTRUCTION

We positively guarantee all work to be of the highest order. None but skilled workmen employed. Write us for information. Cable trouble earnestly solicited.

PLANS, SPECIFICATIONS and ESTIMATES FURNISHED

PEKIN, ILLINOIS

JOHN STONE — W. S. GREEN

STONE & GREEN

Telephone Exchange Contractors and Engineers
1361 Monadnock Bldg., Chicago

We do all kinds of Telephone Engineering and Construction Work
Correspondence Invited.

FRANK F. FOWLE

Consulting Electrical and Telephone Engineer

Composite and Simplex Systems for Telegraphing over Toll Circuits.
Arrangement of Physical Toll Circuits to secure Phantom Circuits.

MARQUETTE BUILDING
204 DEARBORN ST. CHICAGO

D. C. & WM. B. JACKSON

MEMBERS AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS
AMERICAN SOCIETY OF MECHANICAL ENGINEERS
AMERICAN SOCIETY OF CIVIL ENGINEERS

ENGINEERS — EXPERTS

CHICAGO — BOSTON

EDMUND LAND

Telephone Engineer

Telephone Development Studies. Preliminary Reports and Estimates, Working Plans and Specifications, Appraisals, Etc.
Exchange Construction and Supervision.

No. 15 Jones Building DETROIT, MICHIGAN
Correspondence Solicited

WALTER C. POLK

TELEPHONE CONSTRUCTION ENGINEER

PLANS, ESTIMATES AND REPORTS
SPECIFICATIONS AND SUPERVISION

742 Ohio Building TOLEDO, O.

JAMES A. KENNY

TELEPHONE CONSTRUCTION MATERIAL
PROTECTOR and DISTRIBUTING APPARATUS
WEATHERPROOF WIRE AND CABLE
BLACK ENAMELED MAGNET WIRE
TERMINALS, MICA FUSE, FUSE BLOCKS, ETC.

Write for Prices 1112-1113 Monadnock Bldg., Chicago, Ill.

PATENTS, TRADE MARKS, COPYRIGHTS

MAX W. ZABEL

PATENT ATTORNEY

Associate Member American Institute of Electrical Engineers
Expert Opinions, Investigations, Consultations
260 Dearborn St., Chicago, Ill.

J. W. MIDDLETON & CO.

TELEPHONE STOCK CERTIFICATES
NEW ELEGANT STEEL VIGNETTES

Publishers of **Inter-State Corporation Record** containing all Forms and Blanks for Organizing a New Corporation

Stock Certificates, Bonds, Corporate and Notarial Seals, Blank Books, Printing, Lithographing

167-169 DEARBORN STREET :: :: CHICAGO

We have on hand newly manufactured, guaranteed apparatus of all makes

Telephones, Switchboards and Supplies

which we can sell to you at a reduction of 40% to 50% in price. Write us to-day

We rebuild all kinds of telephone apparatus. Make it as good as new. Consult our repair department.

Missouri Valley Telephone & Electrical Construction Co.

123-25 West 6th St., Kansas City, Mo.

TELEPHONE EAR CUSHION Cuts Off All Outside Noises

Samples FORTY CENTS, Prepaid

This pneumatic cushion is made of the softest rubber and can be adjusted to the hard gutta-percha receiver very readily. The cushion conforms to the exact shape of the ear as such an air pad alone could, cutting off outside noises and giving the ear a comfortable cushion instead of a rigid receiver. Holds the ear-drum further from the receiver, and by virtue of the air and flabby rubber cushion it neutralizes the harsh crash! crash! noises. Made by

HURON RUBBER COMPANY, CLEVELAND, O.

IRONITE

PROTECT YOUR DROP WIRES

Get ready for winter's snow and sleet **NOW**—before it's too late. Cut out all the expense of replacing drops *this* winter and put up wire that *won't break, won't sag and stretch*, won't cause a lot of trouble shooting. You want to *save* all you can now, don't you? Do it by installing IRONITE—the Ideal Duplex Drop Wire.

Durant Electric Supplies Co.

58 FIFTH AVENUE, CHICAGO

Alphabetical Index to Advertisers

Abrahams & Co. 18
American Battery Co. 18
American Circular Loom Co. 3
American Elec. Fuse Co. 14
American Elec. Telo. Co. 30
American Electrical Works 30
American School of Correspondence. 15-23
American Wood Preserving Co. 18
Andrae & Sons Co., Julius 12
Armac Motor Co. 29
Automatic Electric Co. 13

Backus-Judd Lbr. & Cooperage Co. 27
Baker & Co. 1
Beidler & Co., Francis 26
Belden Mfg. Co. 15
Blake Signal & Mfg. Co. 12
Brixey, W. R. 1
Brooks, Hall 25
Bruer, Will F. 28

C. A. Mfg. Co. 18
Central Telo. & Elec. Co. 10
Chance Mfg. Co. 21
Chicago Telo. Supply Co. 1
Clay Product Co. 1
Commercial Elec. Supply Co. 22
Connecticut Telo. & Elec. Co. 24
Cook, Frank B. 14
Coolidge Co., Marshall H. 27
Cracraft, Leich Elec. Mfg. Co. 6
Crumb & Co., W. H. 19
Current Electric Co. 29

Deal Lbr. Co., L. K. 27
Dean Electric Co. 7
Detroit Insulated Wire Co. 1
Doty Lumber & Shingle Co. 28
Duluth Log Co. 26
Duplex Metals Co. 2
Durant Electric Supplies Co. 20

Electrical Engineering Co. 18
Ericsson Telo. Mfg. Co., L. M. 9

Fahnestock Electric Co. 30
Faris & Mayhew Lbr. & Pole Co. 25
Fibre Conduit Co. 23
Fowle, Frank F. 19
Frankel Display Fixture Co. 29
French Battery & Carbon Co. 2

Gray Telo. Pay Station Co. 12
Grover-Dregge Lumber Co. 25

Hallett Iron Works 22
Harding, Geo. 25
Holtzer-Cabot Elec. Co. 8
Hoyt Electrical Inst. Co. 24
Huebel Co., C. J. 28
Huron Rubber Co. 19

Independent Telo. Mfg. Co. 8
Indiana Rubber & Ins. Wire Co. 2
Itasca Cedar Co. 28
Iwan Bros. 25

Jackson, D. C. & Wm. B. 19
Johann & Johann 19
Jones & Winter 19

Kaye & Carter 25
Kenney, Jas. A. 19
Klein & Son, Mathias 30
Krueger & Grant Lumber Co. 28

Land, Edmund 19
Leeds & Northrup Co. 2
Lindsley Bros. Co. 27
Long Distance Telo. Mfg. Co. 8

Mansbridge, G. F. 30
Matthews, W. N. & Bros. 25
McMeen & Miller 19
McRoy Clay Works 1
Middleton, J. W. 19
Miller Anchor Co. 18
Milwaukee Elec. Specialties Co. 30
Minnesota Elec. Co. 21
Missouri Valley Telo. & Electrical Construction Co. 19
Monarch Telo. Mfg. Co. 6
Mountain State Electrical Co. 4

Nash & Co., Geo. 21
National India Rubber Co. 30
National Pole Co. 27
North Electric Co. 12

Okonite Co., Ltd., The 1-21

Page & Hill Co. 28
Parker-Kenrick Cedar Co. 28
Partridge Lumber Co., T. M. 25
Peirce Specialty Co. 3
Pendleton & Gilkey 28
Pignolet, Louis M. 18
Polk, W. C. 19
Porter Cedar Co. 28
Premier Electric Co. 8
Protective Elec. Supply Co. 15

Roberts Telo. Co., Homer 10
Roebling & Sons, John A. 3
Runzel Lenz Elec. Mfg. Co. 3

Schwarze Electric Co. 30
Seymour Mfg. Co. 30
Simplex Electrical Co. 30
Specialty Sales Co. 22
Standard Cedar & Lbr. Co. 28
Standard Telo. Mfg. Co. 4
Sterling & Son, W. C. 25
Sterling Electric Co. 16-17
Stevens, Chas. G. 1
Stone & Green 19
Stromberg-Carlson Telo. Mfg. Co. 5
Sumter Telo. Mfg. Co. 4
Swedish-American Telo. Mfg. Co. 11

Telephone Printing Co. 2
United States Coin Reg. Co. 29
Universal Specialty Co. 22

Valentine-Clark Co. 24

Want Advertisements 28
Waterbury Co. 1
Western Lbr. & Pole Co. 26
Weston Electrical Inst. Co. 18-24
Williams Test Clamp Co. 2
Worcester Co., C. H. 26
Wyckoff Pipe & Creosoting Co. 30

Yonkers Specialty Co. 1

Zabel, Max W. 19

OKONITE TRADE MARK REG. U.S. PAT. OFFICE

THE STANDARD FOR RUBBER INSULATION

OKONITE TRADE MARK REG. U.S. PAT. OFFICE

1889 Paris Exposition Medal

OKONITE

TRADE MARK
REG. U.S. PATENT OFFICE.

1893 World's Fair Medal

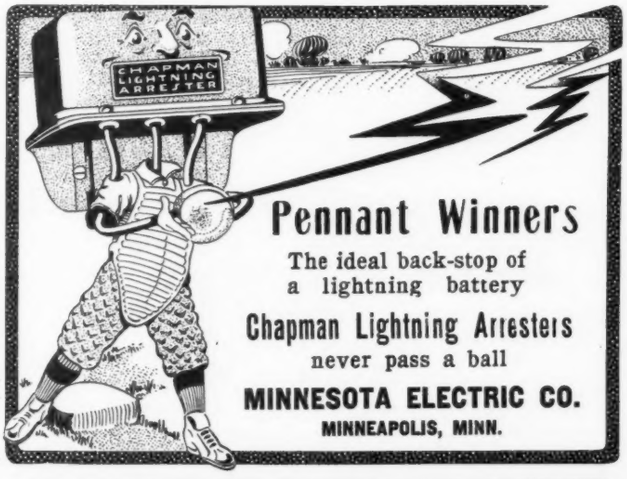
OKONITE WIRES MANSON TAPE
OKONITE TAPE
CANDEE WEATHER-PROOF WIRES
CANDEE PAT'D POT HEADS

WILLARD L. CANDEE, H. DURANT CHEEVER, Managers

GEO. T. MANSON, General Superintendent
W. H. HODGINS, Secretary
W. C. CANDEE, Asst. Secy.

SOLE MANUFACTURERS

253 BROADWAY THE OKONITE CO., LTD. NEW YORK CITY



Pennant Winners

The ideal back-stop of a lightning battery

Chapman Lightning Arresters never pass a ball

MINNESOTA ELECTRIC CO.
MINNEAPOLIS, MINN.

DESIGNED BY PRACTICAL MEN

The Sky Rocket Arrester

Made for practical work, and they do it right. Their mission is to protect your lines from charges of excessive potential whether due to lightning or other causes, and they fulfill this mission invariably and infallibly.

Details, prices and references await your inquiry.

CHANCE MANUFACTURING CO.
CENTRALIA, MO., U. S. A.

We Carry for Immediate Shipment

Capital High Speed Steel	Oil Tempered Wire
Capital High Speed Twist Drills	Music Wire
Eagle & Globe Tool and Die Steel	Tinned Wire
Solar Tool Steel	Cast Steel Binding Wire
Self Hardening Steel	Acme Resistance Wire
Forged Die Blocks	Coppered Bessemer Rods
Spring Steel Sheets	Cold Rolled Shafting
Crucible Cold Rolled Steel	Cold Drawn Screw Rods
Hardened and Tempered Strips	Cold Drawn Shapes
Drill Rods	Cold Drawn Norway Iron
Dental Octagons	Cold Rolled Flat Wire
Roller Bearing Rods	Coiled Springs

Send for Catalogue of Nash Salt Bath Tempering Furnace and our Steel Catalogue

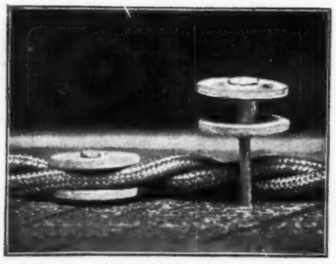
GEO. NASH CO.
New York, 217 Pearl St. Chicago, 115 W. Washington St.
Cold Rolled Drawing and Stamping Steel

Eureka Fibre Insulators

A NEW STYLE

"PRICES TO POINT, WHERE IT IS ECONOMY TO USE THEM"

The value is in the method that they are attached without injury to the wire

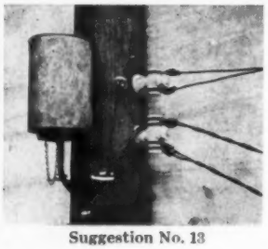


Made in Three Types
50, 60, 70
¾", ⅞" and 1" long respectively

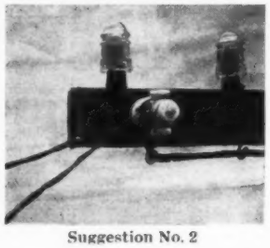
PRICES AND SAMPLES ON APPLICATION

Commercial Electrical Supply Co.

Fifteenth and Pine Streets ∴ ∴ ST. LOUIS, MO.



Suggestion No. 13



Suggestion No. 2

Universal Insulators

SOME ADVANTAGES:

A Separate Groove for Each Wire—Grooves for Any Direction—Universal—All Porcelain—Will Not Rot or Rust—Prevents Damage to Twisted Pair Wires—Reduces Maintenance.

Write for Descriptive Literature

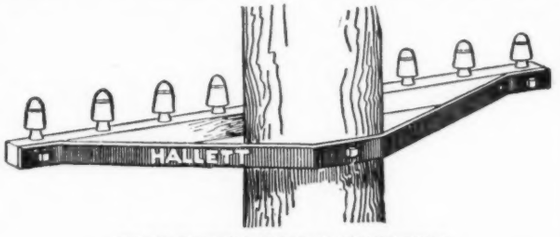
Universal Specialty Company
116 S. Seventh St. Terre Haute, Ind.

Suggestion No. 5

Suggestion No. 8

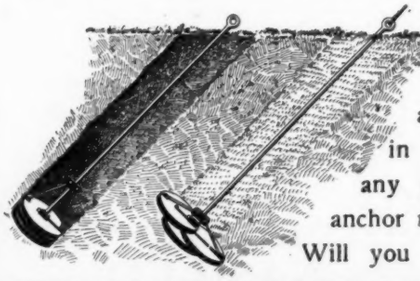
CROSS ARM BACK BRACES

hold the cross arm rigid, which makes Telephone construction work more permanent. We make the braces of flat material or angle iron



HALLETT IRON WORKS
92-96 W. Polk Street, CHICAGO, ILL.

The "EVERSTICK"



guy anchor is higher in efficiency and lower in price than any other guy anchor made. Will you have proof?

SPECIALTY SALES COMPANY
Cedar Rapids, Iowa

THE FIBRE CONDUIT CO. REG. U.S. ORANGEBURG PAT. OFF. ORANGEBURG, N. Y.

In service and interior work

Orangeburg Fibre Conduit

is adapted to the most varied conditions.

This conduit excels iron piping for service work. Its insulating properties and non-corrosiveness enable it to be used in instances where the employment of iron tubing is precluded.

ORANGEBURG FIBRE CONDUIT is well adapted to carrying liquids such as dilute acids, alkalis or corrosive salt solutions: The conduit is not affected by acid fumes: and is admirably adapted for use in chemical and electrical laboratories, for drainage, ventilation, etc.

At the Woods Product Company, Binghamton, N. Y. ORANGEBURG FIBRE CONDUIT of the screw-joint type has been used since 1900 as a run-off for still residue containing sulphuric acid at 175° to 200° Fahr. No deterioration has occurred.

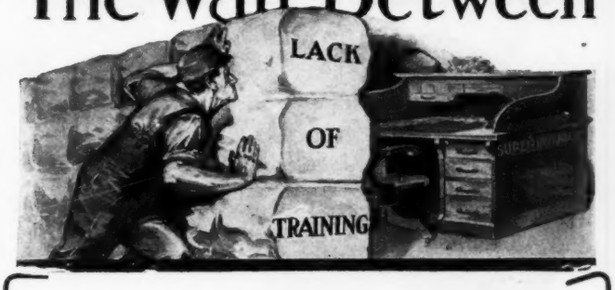
Write for The Conduit Book. Samples of Orangeburg Fibre Conduit sent on request

The Fibre Conduit Company

Main Office and Works:
Orangeburg, N. Y.

Chicago Office, 1741 Monadnock Building.
Pierson, Roeding & Co., San Francisco, Cal.; Los Angeles, Cal.; Seattle, Wash.
McClary-Jemison Co., Birmingham, Ala.

The Wall Between



There's a high stone wall between the untrained worker and the man with **special training**; between the daily bread wages and a good salary; between being "one of the **hands**" and "one of the **heads**" of a business.

Don't let that wall stop **you.** There's a way over it—**Learn more.**

You **must** have **training** now-a-days. You can't afford to guess—you must **know. Special training** fits you for big things, gives you the best chances, insures you a **lifetime** hold on a big well-paid job.

TELEPHONE WORKERS---LEARN MORE

Are you a Lineman, Instrument Man, Switchboard Man, Exchange Man, Trouble Man, Telephone Engineer, Electrician, Draftsman, Inventor, or Patent Lawyer, who wishes to qualify for a more lucrative position, and cannot do so for lack of training? If you are, let us help you. The American School of Correspondence will give you just the **special training** you need. Our courses in Telephone Practice, Telegraphy, Electrical Engineering and Drafting are written especially for **Home Study** by practical, technical men and are as complete and practical as they can be made. In addition to giving the most comprehensive instruction in the usual work, we lay particular stress on the course on the operation and construction of the **Automatic Telephone.**

Spare time study will give you that **training at home**, add to your practical knowledge, fit you to earn **more** and **more** salary—to **be** your best and **do** your best.

The AMERICAN SCHOOL OF CORRESPONDENCE has helped 80,000 men to better positions. Its instructors are practical men. Its courses are the most thorough and down-to-mother-earth. Its students are the most successful.

The help, suggestions and advice of the American School—free and freely given—will show you how to get a climbing hold on **the wall between** you and a **successful** career.

Simply send us the coupon—and do it today. No obligation on your part. We employ no agents.

AMERICAN SCHOOL OF CORRESPONDENCE

CHICAGO, U. S. A.

FREE INFORMATION COUPON.

American School of Correspondence:
Please tell me how I can fit myself to earn a good salary in the line of work marked "X."

—Telephone Engineer	—Surveyor
—Electrical Engineer	—Hydraulic Engineer
—Mechanical Engineer	—Irrigation Engineer
—Boiler and Sheet Metal Pattern Draftsman	—Superintendent of Construction
—Heating and Ventilating Engineer	—Resident Engineer
—Civil Engineer	—Steam Engineer
—Architect	—Structural Draftsman
—Architectural Draftsman	—City Engineer
—Contractor and Builder	—Bridge Engineer
	—College Preparatory Course

Name .....

Address .....

Occupation .....

Telephony, 10-3-'08.

New Weston Eclipse Direct Current Switchboard Ammeters, Milli-Ammeters and Voltmeters

are of the "Soft iron" or "Electro-magnetic" type, but they possess so many novel and valuable characteristics as to practically constitute a new type of instrument.

Their cost is exceedingly low but they are remarkably accurate, well made and nicely finished instruments and are admirably adapted for general use in small plants, the cost of which is frequently an important consideration.

Correspondence concerning these new Weston Instruments is solicited by the

WESTON ELECTRICAL INSTRUMENT CO.

New York Office:
74 Cortlandt Street

Waverly Park, NEWARK, N. J.

Type C 25 Voltmeter

Diameter of Face, 2 1-2 Inches
Overall Diameter, 3 Inches
D'Arsonval Type

Accurate; dead beat; fully guaranteed.
Sent on 30 days' approval.
Made in the following ranges:
Ammeters, 1-100 ampere to 30 amperes.
Voltmeters, 1-100 volt to 25 volts.

Price, $7.50 and upwards

Ask for Bulletin AT

Hoyt Electrical Instrument Works
PENACOOK, N. H.

Never Throw Away a Battery Cell

until you know that its days of usefulness are past. You don't know this in every case without the right instruments

"Connecticut Pocket Meters"

should be in every trouble man's kit. They measure volts and amperes. Durable, accurate, inexpensive.

CONN. TELEPHONE & ELECTRIC COMPANY, Inc., Meriden, Conn.

Send for circular "T"

The Valentine-Clark Co.

ERNEST L. CLARK, President

Michigan Western } **Cedar Poles Exclusively**

All stock concentrated in our main yards

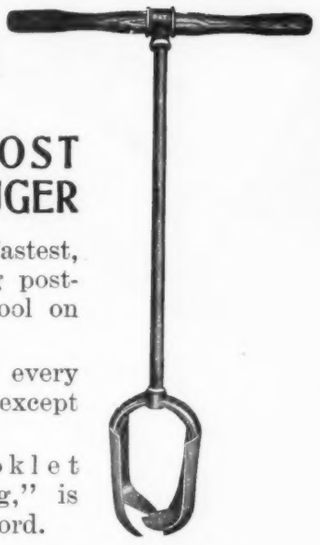
Minn. Transfer, Minn. **Green Bay, Wis.**
Prentice, Wis. **Pinconning, Mich.**

MAIN OFFICE

234 La Salle Street **Chicago, Ills.**

Digging Pole and Anchor Holes

is quick, easy and inexpensive if you use the



IWAN POST HOLE AUGER

It is the fastest, easiest-digging post-hole digging tool on the market.

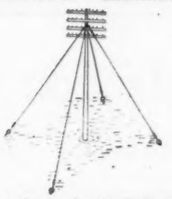
Works in every kind of soil except solid rock.

Our booklet "Easy-Digging," is yours for a word.

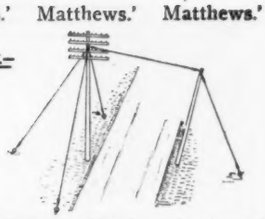
Iwan Brothers

Streator, Ill.

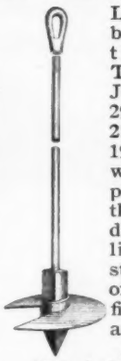
Matthews.' Matthews.' Matthews.' Matthews.' Matthews.'



—STORM GUY.—



Matthews.' **INSURANCE!** Matthews.'



Look up your back copies of the American Telephone Journal of Feb. 29; March 14, 21; and April 4, 1908, and you will see many photographs of the damage done to pole lines by sleet storms because of lack of efficient storm anchorages.

MORAL:

140 ft. of galvanized ½ in. guy strand	$3.80
8 Crosby clips	.24
8 guy clamps	1.20
4 ½ in. guy thimbles	.12
12 guy shims or plates	.32
4 No. 502R MATTHEWS' GUY ANCHORS	2.76
Freight (not more than)	.25
Labor of two linemen, 1½ hours at $2.50	.42
Total cost per storm guyed pole	$8.11

All We Want is the Order for Anchors

W. N. MATTHEWS & BROTHER

Manufacturers of Matthews' Patented Money Saving Specialties

218 N. 2nd Street, ST. LOUIS, U. S. A.

Matthews.' Matthews.' Matthews.' Matthews.' Matthews.'

White Cedar Poles

Being producers we can save you jobbers profits.

Yards in Minnesota, Wisconsin, Ontario and Manitoba. Quick shipments anywhere in United States or Canada.

T. M. Partridge Lumber Co.

Minneapolis, Minn.

Michigan White Cedar POLES

WILL OUTLAST ALL OTHER KINDS

GET OUR PANIC PRICES. We can fill all sized orders from our own stock 150,000 ON HAND. Twenty-eight years have we been producers.

W. C. STERLING & SON CO.

Principal Office: MONROE, MICHIGAN

Yards: Bay City, Omer, Boyne Falls, Cass City and Monroe

CEDAR POLES

ALL SIZES LARGE STOCK PROMPT SHIPMENTS

Write

G. N. WAGNER LUMBER & SHINGLE CO.

923 MICHIGAN TRUST BUILDING

GRAND RAPIDS :: :: MICHIGAN

POLES

WESTERN RED AND MICHIGAN WHITE CEDAR

LONG POLES A SPECIALTY

FARIS & MAYHEW LUMBER & POLE CO.

202 & 203 Continental Building, Denver, Colo.

Producers CEDAR POLES

DREGGE-GROVER LUMBER CO.

Cedar Yards { Ozark, Mich. / Spur 46t Soo Line — General Offices { Grand Rapids, Mich.

WHITE CEDAR POLES

Complete Stock All Sizes

Get my prices before buying GEO. HARDING, Deer River, Minn.

POLES

From stump to consumer. A full assortment of sizes.

KAYE & CARTER, Minneapolis, Minn.

CEDAR POLES

HALLBROOKS CO., Tomahawk, Wis.

Satisfaction

"We are very much pleased with the poles. It is the best car of poles I have ever seen. We surely will patronize you when we need more."

(From one of our new customers)

POLES

Service

Not unusual to load up poles on orders the same day instructions reach us.

Duluth Log Company

General Offices: Second Floor, Palladio Bldg.
Duluth, Minnesota

Cedar Poles

LARGE BUTTS

We cut poles from lands owned by our Company in Northern Michigan on Lake Superior Shore, where the cedar is very **sound** and **stocky** with **heavy butts.**

All sizes in stock all the year round.

Write for a Copy of Our Telegraph Code for Cedar Products Giving Valuable Information About Poles.

C. H. WORCESTER CO.

1708-1710-1712 Tribune Bldg.

CHICAGO, ILL., U. S. A.

White Cedar

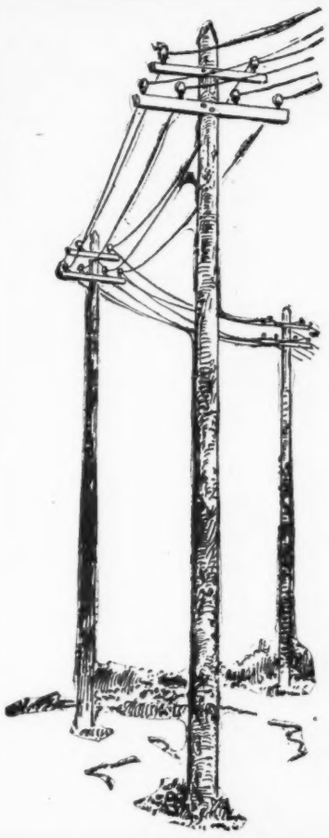
LARGE STOCK—14 to 65 ft.

Prompt Shipment

FRANCIS BEIDLER & CO.

CHICAGO, ILL.

YARDS:
Marinette, Wis. Escanaba, Mich. Superior, Wis.



National Pole Company

Escanaba, Michigan

Successor to the Cedar Department of the

PITTSBURG & LAKE SUPERIOR IRON CO.

Producers and Shippers of

CEDAR POLES

From the Stump to the Line

We carry large stocks of Poles at various points in the States of Michigan, Wisconsin, Minnesota, Idaho, Washington and Maine, and are in position to make immediate shipments at lowest prices and freight rates.

WESTERN CEDAR POLES AND RED FIR CROSS ARMS

THE LINDSLEY BROTHERS COMPANY, SPOKANE, WASH.

EASTERN SALES OFFICE
MONADNOCK BLOCK, CHICAGO, ILL.

WE PRODUCE OUR OWN POLES AND MANUFACTURE OUR CROSS ARMS

SPECIAL PRICES
on 6"-25's and Longer

WHITE CEDAR POLES

L. K. Deal Lbr. Co.
900 Clapp Blk., Des Moines, Ia

100,000 WHITE CEDAR POLES

BACKUS-JUDD LUMBER AND COOPERAGE CO.

MINNEAPOLIS, - - - MINNESOTA

WE MAKE LOW PRICES ON

Idaho Red Cedar Poles

Michigan White Cedar Poles

8 YARDS IN IDAHO—2 IN MICHIGAN

Western Lumber & Pole Co.

Main Office Charles Bldg., Denver, Colo.

CEDAR TELEPHONE & TELEGRAPH POLES

Marshall H. Coolidge Company

OFFICE

826 Guaranty Building, Minneapolis, Minn.

We produce our own stock! Know the requirements of the trade! Have six large yards and several smaller ones! Can make prompt shipments of any lengths from 16 to 60 feet

These Facts Ought to be Worth Your Attention When Buying Poles!

DOTY LUMBER AND SHINGLE CO.

Manufacturers of

Washington Fir
Cross Arms. Red
Cedar Poles and Piling
In any Length
PROMPT SHIPMENTS
Doty, Washington

No Delay No. 3

CEDAR POLES

Shipped From Our Minnesota
Transfer Yard in 24 to 48 Hours

Page-Hill Co.

Minneapolis, Minn.

POLES 20 and 25 foot lengths for rural telephone lines a specialty.

PORTER CEDAR COMPANY

SAGINAW -:- MICHIGAN

POLES Red Cedar and White Cedar

Western Sales Agent—"C. A. WOOD PRESERVER"

WILL F. BRUER, 18 Walnut St., Kansas City, Mo.

PARKER-KENRICK CEDAR CO.

CEDAR POLES

Posts and Ties 349-351 Security Bldg.
MINNEAPOLIS, MINN.

WRITE US FOR PRICES

BUY NOW Big Stock Low Prices Quick Delivery CEDAR POLES

There'll never be a better chance than now.

KRUEGER & GRANT LUMBER CO.

MINNEAPOLIS, MINNESOTA

CLASSIFIED ADVERTISEMENTS

And want advertisements not exceeding twenty words, exclusive of address, will be inserted in these columns for $1.00 each. For over twenty words, the rate will be 5 cents per word.

WANTED—To buy a telephone plant not less than 150 subscribers. Box 175, Danville, Ohio.

MANAGER wishes change. Thoroughly experienced in all details, clerical and technical. Five years' experience as manager and wire chief. Any territory. Address No. 524, care TELEPHONY.

WANTED—High grade telephone man, with technical education, wants responsible position. Experienced in engineering, construction, operating and executive work. Address No. 523, care TELEPHONY.

PARTNER WANTED—To take half interest in established telephone business; large field for local and long distance expansion, good rates, 370 telephones installed. Address No. 520, care TELEPHONY.

NOTICE TO TELEPHONE COMPANIES—Responsible position wanted with a central energy telephone company by an engineer, technical graduate, with thorough experience in engineering, maintenance and traffic work. Best of references. Address No. 521, care TELEPHONY.

WANTED CABLE TROUBLES—If you have any cable troubles that you want located and fixed, drop us a line and we will arrange to send you a cable man or send you the testing apparatus to locate and clear them yourself. Wireless Cable Tester Co., Cedar Rapids, Iowa.

POSITION WANTED—As switchboard man or manager of central energy exchange. Any territory. Technical graduate. Best references. Address No. 511, care TELEPHONY.

CHEMICAL ENGRAVED NAME PLATES and drop numbers. Steel stamped letters and figures. Send for samples and prices. C. H. Hanson, 44 Clark St., Chicago.

FOR SALE—One Warner pole changer, good as new, for half price. Address T. H. Namur, Stanton, Neb.

FOR SALE—Patent for guy anchor. Very strong, quickly installed in solid earth; no pulling to set, no creeping. Cheapest to make. E. W. Swarthout, Patentee, Aurora, Ind.

FOR SALE—Having changed to common battery, we have some magneto telephones for sale for less than half price, consisting of series desk telephones, and wall telephones, compact and long type. Also have a few bridging telephones; Stromberg-Carlson and Chicago Telephone Supply Co.'s make. Address Home Telephone Company, Elkhart, Ind.

FOR SALE—New Stromberg-Carlson generator call, line lamp, multiple switchboard. Capacity, 1,200 lines, 800 lines equipped, 20 toll lines. Chief operator's desk, 10 paid cords. Main distributing frame, 12 vertical sections of 1,200 lines, 820 lines equipped, 1,000 bridging and series telephones. Address No. 522, care TELEPHONY.

WHITE CEDAR POLES

Producers and Wholesalers Prompt Shipments

Standard Cedar & Lumber Co.

34 SECURITY BANK BLDG., MINNEAPOLIS, MINN.

C. J. HUEBEL COMPANY

Room 2, Schale Block, Menominee, Mich.

Michigan White Cedar Poles

Idaho Cedar Poles—all Lengths

Yards: Menominee, Mich.; Nathan, Mich.; Stager, Mich.; Swanson, Mich.

WHITE CEDAR POLES

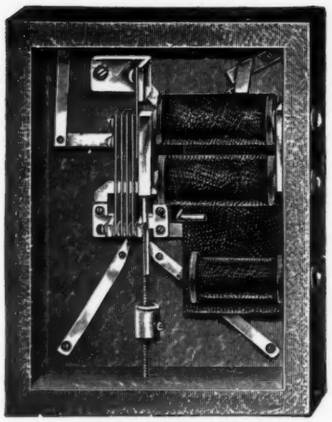
Buy from the Producers
and Save Jobbers' Profits

PENDLETON & GILKEY - Minneapolis, Minn.

NORTHERN WHITE CEDAR POLES

Give best service. Our prices are lowest.
May we quote?

ITASCA CEDAR COMPANY, Deer River, Minn.



"Standard" Pole Changer

Use the "Standard"

THE STANDARD POLE CHANGER

Absolutely Guaranteed

Simple, efficient, economical. Only one battery of forty to fifty ordinary dry cells required. Works perfectly on all alternating and direct pulsating current ringing. Sent on 30 days trial. **Present Price only $15.00**

THE STANDARD DUPLEX SET

Another Money Saver

By using this instrument you can carry on two conversations over any single, metallic bridging line without either conversation interfering with the other. Let us explain it to you. Sent on 30 days trial. **Price complete, per set, $15.00.**

We guarantee both of the above devices to be of the very highest standard. They have successfully withstood all tests of actual service and the keenest competition. The prices are attractive and the terms all that could be asked. **We want every telephone man to have full particulars.** Have you our descriptive matter? If not, send us your address.

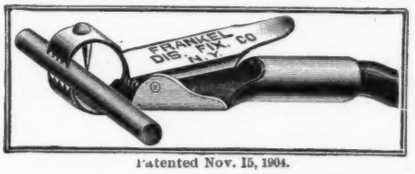
CURRENT ELECTRIC CO., 50 State Street, CHICAGO

Frankel's Electric Testing Clips

SHORT CUTS FOR TROUBLE HUNTERS

You need not waste time baring the wire.

Constructed to test any size line.



Patented Nov. 15, 1904.

THE TEETH grip the line or binding post.

THE PIN pierces the insulation and makes a perfect test connection.

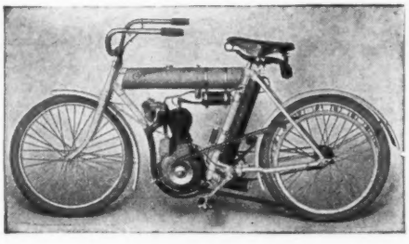
Sample Dozen	-	12½ Cents Each
100 Lots	- - -	11 " "
500 "	- - -	10 " "
1000 "	- - -	9 " "

FROM YOUR SUPPLY HOUSE OR

FRANKEL DISPLAY FIXTURE COMPANY

733-735 BROADWAY, - - NEW YORK, U. S. A.

ARMAC MOTOR CYCLE



MR. HELLO MAN—

Every day you are losing money when you don't use an ARMAC MOTOR CYCLE for trouble men

Write us today for the figures

ARMAC MOTOR CO.

472 Carroll Ave. CHICAGO, ILL.

U. S. COMBINED

CASH REGISTER and PAY STATION

GIVE THE BEST SERVICE

Single Gong only — A Cash Ticket with every collection

NO ERRORS — CASH ACCOUNTED FOR

The United States Coin Register Co.

MONROE, MICH.

American Electric Telephone Co., Chicago

WE ISSUE THE FOLLOWING BULLETINS AND CATALOGUES

Bulletin No. 10—American Express Switchboards.
" " 11—Desks—Toll and Private Branch.
" " 12—Visual Signal and Bell Style Switchboards.
" " 13—Intercommunicating Systems.
" " 14—Line Material and Supplies.
" " 15—Bell Express Self-Restoring Switchboards.
" " 16—Operator's Set and Accessories.
" " 17—Parts of Apparatus
" " 18—Magneto Telephones of all Kinds.

INDEPENDENT LOCAL AND LONG DISTANCE TELEPHONE

Bulletin No. 19—Central Energy Switchboards.
" " 20—Central Energy Telephones.
" " 21—Protective Apparatus and Terminal Equipment.
" " 22—Construction of Country Telephones Lines.
" " 23—Eight-Party Selective Ringing Telephones.
" " 26—Telephone Power and Ringing Equipment.
" " 27—Spanish Edition, Complete Catalogue of Apparatus.
" " 28—Burns Express Type 45 Magneto Switchboard
" " 29—4 Party Harmonic Selective Telephones.

WE SEND THEM POSTPAID, WRITE FOR THEM

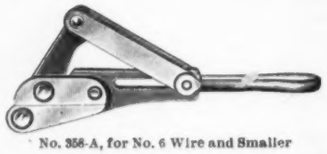
RUBBER COVERED WIRES AND CABLES

For all Classes of HIGH-GRADE ELECTRICAL SERVICE

42 Broadway, New York
N. I. R. Wires and Cables carried in stock by the MONARCH ELECTRIC & WIRE Co., Chicago, Ill.

NATIONAL INDIA RUBBER CO. BRISTOL, R. I.

Klein's New "Chicago Grip"



No. 358-A, for No. 6 Wire and Smaller

is made of steel forging, polished and nickel plated. It is a well-proportioned and reliable tool. The draw link is arranged so it does not fall in the way of the wire. It holds fast on iron or copper wire. Do not fail to have our Catalog on file. It is arranged with Code and List numbers for convenient ordering.

All prominent supply houses carry our products.

MATHIAS KLEIN & SONS
87 W. Van Buren St. Chicago, Ill.

SIMPLEX

FOR SUBURBAN
Underground Connections
USE
Steel Taped, Lead Covered Cables
No Conduit
Quickly Installed
Few Joints

INSULATED
WIRES and CABLES
RUBBER — CAMBRIC
THE SIMPLEX ELECTRICAL CO - BOSTON

The Mansbridge
"DREADNOUGHT"
Self Sealing
CONDENSER
(PATENTED)

Reduces maintenance costs.
Never short circuits or breaks down.
Stands 500 volts permanently and 1000 volts momentarily.
Proof against lightning discharges and power circuit crosses.

Absolutely the Best Condenser

Costs no more than the old kind and is smaller, lighter and infinitely more reliable in use

Apparatus to be up-to-date must be fitted with the Mansbridge **Dreadnought**

CONDENSER

Patented by G. F. Mansbridge, St. Margarets Sanderstead, Croydon, England.
Manufactured in U. S. A.
Applications for license to manufacture in U. S. A. and Canada should be addressed to the Patentee.

LOUIS DeJONGE & CO.
New York Agents, 69 Duane St.

The Wyckoff Pipe and Creosoting Co., Inc.

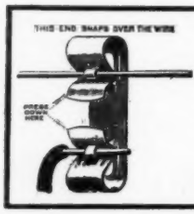
(Established 1881)
Manufacturers and Dealers in
CREOSOTED WOOD
Conduits for Underground Wires and Cables, Cross Arms, Poles, Guy Blocks and Lumber
Wood treated by our dead oil of coal tar process will never decay.
Office: 50 Church St., N.Y. City Works: Portsmouth, Va.

AMERICAN ELECTRICAL WORKS

OUR SPECIALTIES:
TELEPHONE WIRES AND CABLES
CHICAGO 135 Adams St. NEW YORK PHILLIPSDALE, R. I. 26 Cortlandt St.

THE SEYMOUR MFG. CO.

SEYMOUR, CONN.
GERMAN SILVER
RESISTANCE SHEET AND WIRE
COPPER WIRE
BRASS, BRONZE AND COPPER



Fahnestock "Snap-Over" Connector

For connecting bridging 'phones to party line wire. One end snaps over the tight line wire. No dead end needed. Connects iron wire, copper wire or iron to copper wire. Positive spring contact.

FAHNESTOCK ELECTRIC CO.
129 Patchen Ave. Brooklyn, N. Y.

Magneto LOUD RINGING Extension
Telephone Bells

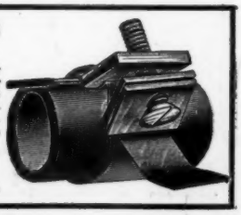
Size of gongs, 2½ in. to 10 in. All resistances. All weather proof. Efficiency, durability and price will interest you.

Schwarze Electric Company
Main Office and Factory: Adrian, Mich.

M. & B. Ground Clamp

"THE CLAMP THAT CLAMPS"

For connecting telephone ground wires to lead or iron pipes. The tighter you set the screw the tighter it clamps. SIMPLE IN CONSTRUCTION, EASY TO ADJUST, FITS ANY SIZE PIPE. No lock nut connection to become loose. Wire soldered to strap. Remains tight whether pipe expands or contracts. No loose connections when our clamp is used.



Cheapest and Best Clamp on the Market
Write us for samples and prices
Milwaukee Electrical Specialties Co. - Milwaukee, Wis.